Air Repair

Vol. 2, No. 1 August, 1952

ST. LOUIS PUBLIC LIBRARY JUL 21 1952
ST. LOUIS PERIODICAL ROOM PUBLIC LIBRARY

JAMES H. CARTER
Commissioner of Smoke Regulation
St. Louis, Missouri
Newly Elected President of the Association

AIR POLLUTION AND SMOKE PREVENTION ASSOCIATION OF AMERICA
4400 FIFTH AVENUE **PITTSBURGH 13, PA.**

Founded 1907

Air Repair

A QUARTERY MAGAZINE DEVOTED TO AIR PURIFICATION

Published by the
AIR POLLUTION & SMOKE PREVENTION ASSOCIATION
OF AMERICA

4400 FIFTH AVENUE PITTSBURGH 13, PA.

Editor
ROBERT T. GRIEBLING
Executive Secretary

Board of Directors
President
JAMES H. CARTER
Commissioner of Smoke Regulation
St. Louis, Mo.

Past President
JOHN L. HODGES
Chief, Division of Air Pollution Control
Philadelphia, Pa.

Vice Presidents
HENRY F. HEBLEY
Research Consultant
Pittsburgh Consolidation Coal Company
Pittsburgh, Pa.

THOMAS C. WURTS
Director
Allegheny County Bureau of Smoke Control
Pittsburgh, Pa.

WALTER O. EVERLING
Director of Research
American Steel & Wire Division
U. S. Steel Company
Cleveland, O.

CHARLES S. FROST
Director, Department of Aid Pollution Control
Roanoke, Va.

Directors
WALTER L. LLOYD
Fuel Engineer
Pennsylvania Railroad
Philadelphia, Pa.

DR. LOUIS C. McCABE
Chief, Fuels & Explosives Division
U. S. Bureau of Mines
Washington, D. C.

WILLIAM E. TIDMORE
Director, Smoke Abatement Bureau
Atlanta, Ga.

L. N. HUNTER
Vice President, Research
National Radiator Company
Johnstown, Pa.

GORDON P. LARSON
Director
Los Angeles County Air Pollution Control District
Los Angeles, Calif.

H. KENNETH KUGEL
Chief Engineer
Division of Smoke Regulation and Boiler Inspection
Washington, D. C.

ROBERT E. NICHOLLS
Smoke Inspector, Windsor, Ontario, Canada
GEORGE A. DAVIDSON
Vice President
Standard Oil Company of California
San Francisco, Calif.

HENRY E. ALDRICH
Manager
American Boiler & Affiliated Industries
New York, N. Y.

W. A. CARTER
Technical Engineer, Power Plants
Detroit Edison Company
Detroit, Mich.

Table of Contents

	Page
Health Aspects of Air Pollution	1
Change of Name	6
Booth Assignments at Cleveland	7
Cleveland Meeting	7
Convention Financial Support	9
Gourmets Recall	10
Cleveland Industry and Smoke Control	11
Our Air Improves	12
American Industrial Hygiene Association Papers	13
Management Looks at Pollution	14
Memo to Members	16
A Scientist Views the Air Pollution Problem	17
Sustaining and Company Members	19
Rusting of Low Alloy Steels	20
$200,000 More for Smoke Control	20
Medieval Germany	21
Chicago Research Project	22
Role of the Pennsylvania State Bureau	23
Public Relations Aspects	28
Boroughs Association	32
Allegheny County Industries Spend $200,000,000	33
English Anti-Smoke Leader	34
New County Control District	35
Radioactive Tracers	37
Survey of Pennsylvania Laws	38
Stoker Manufacturers Elect	43
Chaos Versus Planning	44
Air Pollution—Book Review	46
Black Bonanza—Book Review	47
Point of View	48

The Editor welcomes writers interested in Air Pollution problems and encourages them to use the pages of this magazine for the expression of their opinions. But neither he nor the Association assumes responsibility for the validity of these opinions.

Health Aspects of Air Pollution

A Condensation of the
Principal Address, 45th Annual Meeting
Air Pollution and Smoke Prevention Association
Cleveland, Ohio, June 12, 1952

by DR. R. A. KEHOE
Kettering Laboratory, Cincinnati, O.

WHAT I shall talk about today will be partly the presentation of some facts about air pollution in relation to health, but mostly in connection with the development of a point of view.

I should not like to say that I think that consideration of legislation is redundant. One could wish that we might keep our legislative mind just a little bit fluid perhaps until we do accumulate somewhat more of the facts that are necessary to good judgment.

I think that one of the first things that we need to do is to get some idea of the nature of air pollution. I think it is rather important to recognize that this is not a new problem. I think it is rather important to recognize that we have a great deal of difficulty in even defining what we mean by "air pollution."

What is pure air? If we read the textbooks of chemistry, or any of these books that try to present to us the nature of the world in which we live, we would get the idea that the atmosphere is composed of oxygen, nitrogen, some traces of some small quantity of carbon dioxide, some rare gases and nothing else but water vapor. That has probably never been the case in any part of the atmosphere that surrounds this group because the atmosphere that surrounds us has always been contaminated with materials that have arisen from the planet.

There was a time when we had nothing but air pollution in which life could not survive, on any part of this planet. Then we went through a period in which we cooled off, developed a different type of atmosphere.

We have always had stardust in the atmosphere about us and it has been made up of many materials, and a great variety of other elements.

We have always had dust in this envelope, dust which picked up soil, sand and a variety of other things. Since the time when we have had vegetation growing on this soil we have had a great deal of the materials of vegetable origin in the atmosphere.

There can be no serious question at the present time, from the hygienic point of view, but that we as a human race have had more grief from pollens, from air pollutants of a natural origin than we have had from the total combination of all the things that we ourselves have done to contaminate the atmosphere.

We require a little intellectual equilibrium on this subject, we require a

Dr. Kehoe

little balance and we must not take the point of view that the situation in which we are living at the present time is newly-created and that it has been done by people who have been thoughtless, careless or who have tried to earn their living without regard to the health of the other people who live on the planet.

Actually, we are concerned with a great activity of humankind throughout history and, as it has been pointed out also, with the problem of air pollution to the extent that we regard it as an artificial one, as the result of man's activities.

We now have environmental problems to contend with which we have created ourselves, and we have had the ingenuity to contend with many of those that have been visited upon us by nature. It would seem reasonable that we should be able to contend effectively with those that we create ourselves.

But, as to the other sources of natural air pollution, geysers, hot springs, volcanoes—all of these things have poured out gases, toxic materials, malodorous materials to mix with the atmosphere and, in addition to that, we have had forest fires. As a result of lightning we have had grass fires. We have had serious air pollution in certain areas, air pollution to such degree that it would cause the death of living things in that area.

Gases, then, from the interior of the earth, water picked up by solar evaporation—gases from decomposed vegetation, giving rise to methane, carbon dioxide and the like—ash smoke vapor from conditions under the earth and, as I mentioned, from volcanoes. Now all of these, then, have made for contamination of the atmosphere which we breathe—along with a host of particulate materials.

Now, the human aspects of this problem come, primarily, with the growth in population. Those of you who have lived as long as I, and remember the horse-and-buggy days, remember the extent to which we had to eat dust and breathe dust in going along the country road behind the horse and buggy. Now we go along behind a truck or bus and we smell objectionable smells. For my part, I will trade that for the dust we used to have to swallow along the country road.

As we have had the congregation of populations in cities, villages and agricultural areas, with their various and sundry activities, we have finally come around to the industrial era in which we also have the activities of the entire population that goes to make up the city, contribute to this problem of air pollution.

Air pollution, as we know it in the modern city, is not primarily, or solely, or even overwhelmingly a problem of industry. It is the problem of the activities of the entire community in providing for the maintenance of temperature, in furnishing power, in disposing of its wastes.

These are problems of a highly technological society which is not likely, I think, to stop its technology to enable us to catch up with this problem. We shall have to catch up with it while the technologic process goes on. With the growth and development of this enormous industrial plant of ours, country-wide, we have added to the problem to the point where it has come to the threshold of nuisance, of discomfort, and perhaps of disease.

The problem of dealing with this successfully, of keeping out of the atmosphere troublesome, malodorous, uncomfortable and, perhaps, even highly dangerous materials is inevitably a costly problem.

We shall have to catch up with this, and it is not a small problem—and it is not one that we can duck. It will have to be done. This highly industrialized nation cannot go on in its present development without industry and the other facets of the community learning the nature of the problems that they are producing.

We are creating environmental hazards to replace those that we have learned to get around, and we must learn to control them. Now, if in the process of doing that, we maintain an environment that is favorable for ourselves and our children, and our children's children, from the point of view of health, it is obvious that it will be worth anything that it costs.

On the other hand, and this is why we must look at this problem with care, the bill for this job will be enormous in any case. If we could get away from the business of dumping our treasure down the rathole of international wars we would be able to tackle this problem, with the financial resources that it requires, and to put it behind us much more rapidly.

It has already been mentioned that the conditions with reference to the health of our people have, in recent years, reached such a level as no society has ever seen. Despite the accumulation of populations, the enlarged centers where the hazards are great we have, on the whole, done not a bad job. But, we have walked into some problems which we should have anticipated

YOUR CLEVELAND HOSTS — Herbert G. Dyktor, Commissioner of Air Pollution Control, seated at his desk and surrounded by members of his staff. The group includes Leonard Adler, Stephen Bondra, Samuel Close, George Craig, Harold Cutter, LeRoy Diehl, Tibor Gasparik, Leonard Goldston, Robert Howenstine, Thomas Kinder, Harold Ladd, Fletcher Miles, Howard Scott, and William Wilson.

a little sooner. There is, for example, and unquestionably quite apart from the economics of the laundry and that sort of thing, the problem of nuisance.

I could point to you numerous examples which you will all recognize as a nuisance, of bad smells, et cetera. And they are increasingly bad with a somewhat spoiled people who have made somewhat of a fetish of comfort, of convenience, a people that have learned not only to want but to acquire luxuries—these things come in and spoil the picture. We do not like the bad smells that come from the stockyards, from the soap factories, that come from this, and that and the other thing.

Concerning nuisance, then, I think we should say—speaking of bad smells—we should speak of the dirtiness of many of our cities. We should speak of the fact that we not infrequently obscure the sunlight in certain parts of our cities. It is rather apparent, when you look at this whole matter of nuisance from the point of view of the well-being of our population, that it is not a thing that can be turned off readily, easily, conscientiously with a shrug of the shoulders.

Dirtiness in one's surroundings is depressive. Bad smells in one's surroundings are considerably more than depressing. It is entirely possible, and we are by no means certain of it, that to the degree which we exclude the sunlight we may be removing health factors from our general environment. It seems reasonably certain that we dissipate the effect.

Now, the example has been made of Los Angeles. Los Angeles happens to be, in some respects, unfortunately situated, in that it has that Pacific inversion out there with the sea on one side and mountains behind it that prevent the purification of the air, so that there is a movement back and forth with the tides of air, day and night—to move the air that is contaminated back and forth over the population without letting it spread itself upward.

It is worth while to remind you at this point that these are matters that ought seriously to be considered by industrial organizations in the location of industrial plants. This is particularly true of those that give rise to what are known to be significant problems of nuisance or of health, of destruction, for example, of crops.

But, from the point of view of discomfort, I doubt if there is a citizen dwelling in our society who has not from time to time been uncomfortable as a consequence of the air pollution that was close to him. Whether it was a motor bus, whether it was the air pollution that comes from a railroad tunnel, whether it was that associated with industrial plants—these things, from time to time, do create real discomfort.

We have seen this threshold moved, in Los Angeles, from one previously more or less innocuous to one that has in an early period, now somewhat diminished, give rise to irritation of the eyes, some irritation of the nose and throat.

Then there are probably—and by no means proved—contributory effects to the discomfort of those who are already somewhat disabled by chronic disease. I don't know how much to make of this—and this must have a question mark after it. But, those of us who have watched people with sinusitis, with chronic upper respiratory disturbances, with asthmatic conditions, have come to believe—whether correct or not—that the severity of these, the frequency with which the individual is uncomfortable and partially disabled, the frequency with which he is rendered almost invalid for a time comes

AMONG THE INTERESTING PAPERS PRESENTED
at the
AMERICAN INDUSTRIAL HYGIENE ASSOCIATION
Meeting April, 1952

A Critical Evaluation of the Dustfull Technique for Determining Air Pollution:
Bernard D. Tebbens, Ph.D., University of California, School of Public Health, Berkeley, Calif.

Results of a five-Year Air Pollution Study of the Cincinnati Area:
J. Cholak, Ch.E., L. J. Schafer, and R. Hoffer, Kettering Laboratory, University of Cincinnati College of Medicine, Cincinnati, Ohio.

Preliminary Performance Data on the Spiral Sampler:
Charles D. Yaffe, Senior Sanitary Engineer, Andrew D. Hosey, Sanitary Engineer, James P. Sheehy, Assistant Sanitary Engineer, and Robert S. Lloyd, Senior Assistant Sanitarian, Division of Occupational Health, U. S. Public Health Service, Cincinnati, O.

Statistical Correlation between Meteorological Observations and Air Sampling Data—Donora, Pennsylvania, 1949-51:
Prof. Hurd C. Willett, Department of Meteorology, and Prof. George P. Wadsworth, Department of Mathematics, Massachusetts Institute of Technology, Cambridge, Mass.

Infra Red Spectra of Air Pollutants Collected on Activated Carbon:
Amos Turk, Ph.D., Director of Research, W. B. Conner Engineering Corporation, Danbury, Conn.

The Role of the Bureau of Industrial Hygiene in Air Pollution Control in Pennsylvania:
Joseph Shilen, M.D., Director, Bureau of Industrial Hygiene, J. S. Sharrah, Acting Assistant Director, and Charles D. Robson, Principal Research Technician, Division of Air Pollution Control, Pennsylvania Department of Health, Harrisburg, Pa.

The Importance of Sampling Velocity on Particle Size Distribution:
Philip Diamond, Bureau of Smoke Inspection and Abatement, Department of Buildings and Safety Engineering, A. J. Kaimala and Ralph G. Smith, Bureau of Industrial Hygiene, Department of Health, Detroit, Mich.

An Industrial Atmospheric Pollution Study:
J. C. Radcliffe, Supervisor, Industrial Health Unit, and W. F. Delhey, Industrial Hygienist, Ford Motor Company, Dearborn, Mich.

Problems Encountered in the Field Use of the Thomas Autometer:
Paul M. Giever, Sanitarian, Division of Occupational Health, U. S. Public Health Service, Cincinnati, O.

Natural Radioactivity as an Index of Atmospheric Stability:
Ralph G. Smith, Bureau of Industrial Hygiene, Department of Health, Detroit, Mich.

The Use of Exposure Panels in Measuring Air Pollution:
William L. Wilson and F. C. Miles, Division of Air Pollution Control, Department of Health and Welfare, Cleveland, O.

The Counting of Dust Particles by Phase Microscopy:
Germain Crossmon, Chemical Research Laboratory, Bausch & Lomb Optical Company, Rochester, N. Y.

and goes with weather conditions which also influence local air pollution.

Now, it happens that I think very strongly of the significance of that point. There is no proof for it. Much that has been said about this problem, from this point of view, is the accumulative opinions of persons who, like myself, have an opinion which is not substantiated but, because it is the opinion of thousands and hundreds of thousands, has the increasing validity which comes with numbers while it is still an unsupported point of view.

There is such a thing as a popular voice which expresses itself from time to time—sometimes not wisely but, many times, very effectively. You can put this particular matter to a vote and I believe that you will find that an increasing number of people believe that there is a factor of that sort, however measured, in this problem of air pollution. When that vote gets big enough to require legislation it doesn't really matter too much whether that point is proved or unproved. It becomes a pragmatic fact of life.

Now, to come to more specific hygienic effects. As to acute manifestations of diseases from air pollution, we have a number of examples. I shall mention these despite the fact that they are not important in the overall picture. They are, actually, somewhat irrelevant except as illustrations of what happens when the irritant or potential injurious agent reaches a certain level.

That is, I think, the only important significance of a problem presented to us, like that which occurred in Donora. It is an illustration of what may happen when under a peculiar set of circumstances, almost unique, the effluents from a city, its homes, its transportation equipment and its industries are closed in a basin by means of a lid, which stays there for an unprecented length of time, and allows a combination of effluents to build up their concentration to the point of producing acute effects. The acute effect in this instance was acute upper respiratory irritation, which, selectively, picked off 18, 19, or 20 people—and I have indicated the number as being variable because we cannot substantiate exactly—but, selectively picked off a group of people, some nearly cardio-respiratory diseases, that it only took a little push to move them over the line of ability to survive.

Now, that has happened and, as I say, it is an illustration of what can happen when the conditions are bad enough—as they rarely have been.

There is, as I mentioned a moment ago, this acute response which we see when the pollen gets so dense in the atmosphere that we develop acute reactions to it and, finally, we either have to go indoors and filter out the air or have to get out of this part of the country in order to be even measurably comfortable.

There are acute responses that have come on numerous occasions when people happen to be in a close proximity to an industrial plant or to a public service agency in which, by virtue of some accident, some operating error or something of that sort, an irritant material or potentially poisonous material escaped into the atmosphere in high concentrations and involved all the people within the limit of adequate concentration.

This brings us, however, to the evidence for or against the existence of chronic diseases in over-all groups of our population as a consequence of general community air pollution. Here, with one or two exceptions, we are dealing with conjecture, and with the point of view that if you can get an acute effect from a high concentration of material you must be able to get a little adverse effect from a low concentration of the material.

I can't go into the fallaciousness of that argument but I can say this concerning it: We still have to recognize that in general, injurious effects of the type of toxicity are not the characteristics of a substance per se but are the characteristics of certain limits of concentration within certain definite periods of time. There is scarcely any substance that goes to make up the composition of the earth to which we are not exposed, in greater or lesser degrees, and most of the elements of the earth actually go to make up the protoplasm of which you and I are composed. It is obvious that these materials are, in the main, either useful in the elemental economy or they are incidental and inevitable, and thus harmless.

Toxicity, therefore, is a function of increasing the concentrations of one or a group of these materials to a point where they interfere with appropriate functions—just as we know that in some instances, in certain parts of the earth where certain materials are lacking, we suffer deficiency diseases as a result of not having an adequate amount of these materials in the body.

Our problem is to determine what are the limits of concentration and time that resulted in the damage. Now, if there are chronic offenses as an expression of air pollution these must almost certainly originate and give evidence of damage to the respiratory apparatus.

Therefore we would think, first, of injury to the respiratory organs. It is true that up to the present time what evidence we have of injury from anything that is present in the atmosphere, it has been substantially in the form of a respiratory disease. We would, then, concern ourselves with sinusitis, pneumonia, with bronchitis, and pulmonary cancer,—a disease which is very definitely on the increase. It occurs five times as frequently in males as in females. It has been increasing in our general population for reasons we cannot put our finger on. And in the period in which it has been increasing it has, apparently, increased somewhat more rapidly among males than among females.

Various arguments have gone on and there have been a number of attempts to associate this with smoke, with soot fall, with the dust fall of our cities in general and with other specific features of air pollution. The difficulty has been that we have not had broad minute details of epidemiological investigation which would put this on any sound basis.

With reference to pulmonary cancer I would like to remind you of an article in the press, from one of the A. M. A. meetings in Chicago, that pulmonary cancer is definitely on the increase among males because they smoke too much tobacco. Why not among females, too? If this increase in pul-

monary cancer among the males is greater than that of the females—why should that particularly have been the case during this period of the last 15 or 20 years when all of our womenfolk have been out-doing us in smoking?

We have no evidence at the present time, other than the working hypotheses, that the increase in pulmonary cancer is due to anything in the air.

The same goes for the incidents of pneumonia, bronchitis and the like. The fact of the matter is that we have no sound human observations that would allow us to draw the conclusion that air pollution is a factor in the production of these diseases. It happens, at the present time, to be a hypothesis that would be very popular to adhere to. Because it is popular it has many adherents. But, the evidence is no better now than it was 10 years ago.

What is the relationship of this to industry? Most of what we know for certain about the effect of atmospheric pollutants, singly and in combination, has come from the systematic observations that have been accumulating over the period of the last quarter century in the field of industrial hygiene: studying the exposure of individual and collective workmen to industrial products of a wide variety and kind.

In the course of this we have developed a number of convictions, some of which may be taken a little too seriously in spots—for both legislative and administrative purposes. But, we have developed certain convictions with respect to what represents good industrial practice in terms of the extent of the contamination of the atmosphere with this, that or the other material.

Those have served a very useful purpose in a number of ways; in crystallizing and in pointing out the direction of research in the industrial environment, of intensifying our clinical study of individuals under conditions of occupational exposure. As a consequence of what we have developed criteria which tell us in principle, within certain limits of error, that if X material is in the atmosphere in concentrations not above a certain level individuals may work with immunity in that area for seven or eight hours a day, five days a week over periods of years without any appreciable probability of damage.

Now I say, therefore, that what criteria we have for safety in this matter have come substantially from these observations in industrial health and it is quite fair to say, at this point, that the materials to which industrial workmen are exposed occur in the working environment in higher concentrations, generally speaking, than they do in the atmosphere of the city. To that extent, therefore, we have developed criteria of safety for the industrial worker. These are in a measure applicable to the community as a whole—but not specifically applicable for one, two or three reasons.

In one case we are talking about the

Executive Secretary's office in the suite provided by Mellon Institute for the APCSPAA. Only seven new fellowships were accommodated by the Institute in 1951. Seven more are waiting for space, and 20 are under consideration for future commencement.

Roberta Vetter and Ruth Heskett busy themselves with Association chores in their new quarters. The sand-colored glazed tile walls, the deep-piled green rug, and the gray desks provide a harmonious background.

We're Going to Change

OUR NAME!

Our long name is about to be a thing of the past. The By-Laws Committee presented a suggested revision to the membership in February, which was discussed at the Annual Meeting in Cleveland in June, and is now being voted on by letter ballot.

The name selected as most popular was the following:

Air Pollution Control Association

Please be sure to mail in your vote as soon as possible, so that we can speedily make the appropriate changes in stationery, folders, literature, telephone book, etc.

industrial population. We are talking about a selected and relatively healthy, certainly not disabled, population, — whereas when we talk about the general population we are talking about the general group of people of all ages, of all races, of all degrees of health and disease and the problem with this mixed papulation is not precisely the same as it is with our selected population of adults in a reasonably good state of health.

The other feature of this, that is not applicable is the fact that we are talking about an eight-hour day, 40 hour week, or something of that order of magnitude, in industry, whereas we are talking about a 24 hour day and a seven-day week when we are talking about the general population. The criteria, then, do not precisely apply.

In the case of the industrial population, generally speaking, we are concerned with the hazardous characteristics of a specific type of material and not with the whole gamut of chemicals that are known or found in the industrial plant.

In other words, John Smith and Bill Jones are engaged in the manufacture of X material and their exposure occurs together. Other men are over here in another part of the plant where they are handling another material, with specific hazards, and they are not exposed to this. There is, where we are dealing with specific hazardous materials, an attempt at isolation.

We feel, however, that with the polluted atmosphere of a modern industrial city we are dealing with a mixture, in that layer of atmosphere, of practically all of the industrial materials of that area—plus all the other pollution products and waste materials that come from homes and the like.

The composite picture, then, is different. Because it is different it creates an exceedingly difficult problem from the experimental point of view. Now, there is probably not a single city in the United States in which we can characterize the composition of the air that people breathe, chemically speaking.

It has certain things in it that we all know about. It has many other things that we know nothing about. Without indicating in any way, taking an alarmist attitude, I want to cite to you one quite interesting example of where we had difficulties which we did not anticipate.

We have had one material introduced into the atmosphere of one of our cities—maybe more than one, but in one at least—which has been studied very carefully. In exceedingly low concentrations it has produced an organic and fatal respiratory disease in the general population. I am speaking, here, of a city that is almost near enough to touch and of a material that has come to be known to toxicologists and hygienists, namely beryllium. So, we have now set the level for beryllium compounds in the atmosphere of the city at an incredibly low level—a few hundredths of a microgram for 10 cubic meters of air.

Now, we do have beryllium in the atmosphere in many, if not most of our cities. Its presence is more or less inevitable within certain limits of a certain type of industrial plant but, in the quantitative sense—at the present time we know how to describe, in reasonably satisfactory terms, even that elusive hazard so as to produce safety within the population. I merely mention the fact that in a technologic society, such as our own, which never stands still, which moves on to new products, new processes, new developments—almost to exceed one's imagination—we shall have to recognize that there are unknown dangers, some of which we will learn the hard way.

Now, we do have the experience in industry, the experience of occupational medicine to serve as a red light—to point out the possibility, the likelihood of disease in the general population from air pollution as a contrast with disease as an expression of occupation.

Our greatest security in this regard, for the general population, is the careful continued study of occupational health. Research into the environment of the industrial plant is the means by which we shall find the bounds which define danger to the public in this area.

It is not at all likely that we will quit our industrial researches, our adventures into the new things in production and in industrial development. The appropriate safeguard will be the careful collection of information from the industrial environment to translate as well as we can into the environment of the entire population.

This, then, is what we have to look to in the future. I have tried to develop an equilibrated point of view toward a type of society which is modern in character, which seems destined to be the type of society in which we and our children will continue to live—in which we are creating for ourselves environmental hazards.

They are not as great as we sometimes feel. These are hazards, however, which we are likely to lose sight of. Our problem, therefore, is that of guarded legislation, guarded control of these problems: guarded in the light of information that we can gather within

the field of medical research.

We shall not know the significance of air pollution to the health of our population until we have had one or more, at least, comprehensive investigations of illness as it is influenced by this problem, in a number of industrial communities, carried out by experts in the field of epidemiology.

That is the problem that lies ahead of us. We shall have to do two things, as technologists. We shall have to know in detail the composition of the air which we breathe. We shall have to know, as medical men, the effects that are sustained over long periods of time in our population, in all ages and in all economic states in order to be able to appreciate the significance of this problem.

BOOTH ASSIGNMENTS
Cleveland Annual Meeting

Combustion Engineering Superheater, Inc.
Morse Boulger Destructor Company
Iron Fireman Company
Combustion Control Corporation
Dayton Automatic Stoker Company
Mine Safety Appliances Company
Donley Brothers Company
Consolidated Engineering Corporation
Joseph Goder Incinerators
Will-Burt Stokers
Western Precipitation Corporation
Perma-Top Company
Bailey Meter Company
Catalytic Combustion Corporation
Cleveland Fuel Equipment Company
Aerodyne Development Corporation
Cleaner Air Week
Bituminous Coal Research, Inc.
North American Manufacturing Company (two booths)
P. J. Shomer
Detroit Stoker Company
The Ric-Wil Company (two booths)

CLEVELAND ANNUAL MEETING HUGE SUCCESS!

by
Robert T. Griebling
Executive Secretary, Air Pollution & Smoke Prevention Association

It's all over but the shouting!

CLEVELAND, that is. And those of us who had the pleasure of attending the Association's finest and most enthusiastic meeting don't even know where to begin when we are asked to describe it.

Since we must start somewhere, let's talk about the six men who were elected to our Board just prior to the meeting, and who were so enthusiastically received in the sessions, in the lobby, in the dining rooms, and in the smoke-filled suites, where the bull sessions were being held from crack of dawn to crack of dawn.

James H. Carter, Commissioner of Smoke Regulation, St. Louis, Missouri, was elected President for the coming year. A better choice could hardly have been made, for Dad Carter has been an outstanding national figure in air pollution control work for 20 years.

He was born in Hannibal, Mo., and was graduated from Washington University with a degree in Mechanical Engineering in 1920. After a year as power test engineer with the Aluminum Ore Co., he went to Chicago as a field engineer, and then traveled north to Sheboygan, Wisconsin, where he was assistant and later acting manager of the Sheboygan Lime Works.

From 1933 to 1938 Dad sold stokers, oil burners and other heating specialties, then joined the St. Louis Division of Smoke Regulation, which he now heads.

Canada Represented

The Association can be proud of the fact that it again has a Canadian on the Board. Robert E. Nicholls, who heads the air pollution control work in Windsor, Ontario, was elected as one of the two air pollution control officials to be put on the Board. The other was H. Kenneth Kugel, Chief Engineer, Smoke Regulation and Boiler Inspection, Washington, D. C.

Mr. Nicholls began his engineering career in a Windsor dairy. To obtain experience, he changed positions several times, in each case going to a plant equipped with greater horsepower.

When the war came along, he joined the Royal Canadian Air Force as a heating engineer, and then, following his discharge in 1946, he was employed for two years by the General Motors Corporation of Canada, Ltd.

He was appointed Chief Smoke Inspector of Windsor in 1948, at which time he also joined APCSPAA. Bob Nicholls has been a loyal and enthusiastic member, having served on the Auditing Committee, the Revision of Constitution and By-Laws Committee, and the Smoke Emissions and Marine Committees.

He is affiliated with the International Joint Commission which is at present making a survey of the Detroit River Area Pollution.

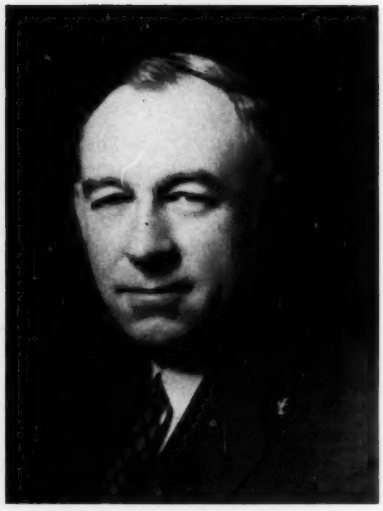
Kugel Chosen

Ken Kugel has had his present job for the past 16 years. He is so retiring that we were unable to get his photograph, and those who have met him at various annual meetings must rely on their memories for an idea of his appearance.

This genial University of Michigan graduate, whose activity has been recognized by the National Association of Power Engineers, who made him an honorary member, is one of the greatest supporters of our Association.

He is a life member of the American Society of Mechanical Engineers, and a member of both the American Society of

W. A. Carter



H. E. Aldrich

Heating and Ventilating Engineers and the National Board of Boiler and Pressure Vessel Inspectors. Ken has had a multitude of jobs in the 40 years that he has been out of school. He was a sales engineer, an erecting engineer, a mechanical superintendent, and during World War I served as a lieutenant in the Engineer Corps.

From 1926 to 1932 he was Deputy Smoke Commissioner and Commissioner of the City of Cleveland, then followed through with a job as combustion engineer for the Cleveland Board of Education. And when Washington called in 1936, he packed his bags and went.

Excellent Industry Panel

The three industry representatives elected to the Board this year include George A. Davidson, Vice President, Standard Oil Company of California, Los Angeles; W. A. Carter, Detroit Edison Company, Detroit; and Henry E. Aldrich, Manager, American Boiler and Affiliated Industries, New York.

Mr. Davidson joined the Standard Oil Company in 1921 as a chemist in the Research and Development Department at the Richmond refinery.

A native of Venango, Nebraska, Mr. Davidson was born in 1896. He moved to California in his youth, attended San Diego High School and graduated from the University of California at Berkeley in 1920 with a B.S. in chemistry.

Early in his career with the company Mr. Davidson transferred to the Manufacturing Department and thereafter served in a variety of capacities at the El Segundo and Richmond Refineries.

He was appointed superintendent of El Segundo in 1933, and in 1937 transferred to the San Francisco home office to serve as assistant to the general manager of the Manufacturing Department.

Mr. Davidson became assistant general manager in 1943, assistant vice president shortly thereafter, and was elected a vice president of the company in 1944.

A member of Western Oil and Gas Association, and chairman of its Industrial Waste Disposal Committee, Mr. Davidson played an important part in cleaning up refinery water pollution problems in California; also actively participating in the Association's Smoke and Fumes Committee which has succeeded in reducing to a minimum refinery discharges of smoke and fumes in the Los Angeles smog area.

During World War II, he served as a member of the Aviation Gasoline Advisory Committee and was chairman of No. 5 District Aviation Gasoline Subcommittee. More recently he has served as Chairman of the Refining Panel of the Military Petroleum Advisory Board which has been quite effective in helping military people in their oil problems.

Carter vs. Carter

It is tough having two men on the same Board with the same name at the same time. However, we are going to make the best of it and are indeed proud to add W. A. Carter to our list of distinguished officers.

G. A. Davidson

R. E. Nicholls

Two minutes after meeting him you can begin calling him Nick. That is the kind of person he is. He is a 1913 Cornell graduate who spent his entire professional career with the Detroit Edison Company, first in the Research Department and presently in the Production Department where he directs technical phases of steam-electric power-plant operation, testing of mechanical equipment, and coordinating design of automatic control systems and instrumentation of the company's new plants. Nick Carter is a registered mechanical engineer, a consultant on industrial power plants, and also a member of the Special Com-

mittee of the Engineering Society of Detroit which aided the city in drafting its present smoke ordinance.

He is a Fellow of American Society of Mechanical Engineers, having held several appointive and elective offices in the local and national divisions of the Society. He has served on several of its administrative, research, and code-making committees.

He is a member of Tau Beta Pi, Sigma Xi, Engineering Society of Detroit, Economic Club of Detroit, Detroit Yacht Club, and the Engineers' Club (New York City).

Big Boiler Man

Henry Aldrich, although having lived in New York City for almost 20 years, is proud of the fact that he was raised in Michigan and still considers himself a midwesterner.

He was employed by the Wickes Boiler Co., Saginaw, Mich., one of our company members, for 18 years, and joined the American Boiler and Affiliated Industries as Secretary in 1933. Four years later Henry was promoted to Manager, a position he has held ever since. He is a member of the American Society of Mechanical Engineers (vice-chairman Boiler Code Committee; chairman Executive Committee; and chairman Sub-committee on Power Boilers); American Society for Testing Materials; American Welding Society; American Trade Association Executives; Photographic Society of America (Stereo Division); Registered Professional Engineer.

Good Time Had By All

And now for the Convention itself. About 600 were present, including more than 90 wives, and it was by far the most enthusiastic Convention the Association ever held. Roanoke had that honor with 375 registrations last year, and those of us who were witnesses to the enthusiasm for the Association's revitalized program are now wondering how many will appear in Baltimore next year.

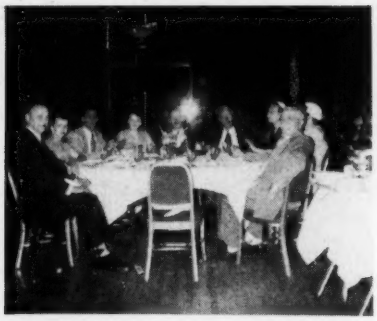
There was spirited rivalry for the 1953 Convention and Baltimore got it because its representatives put on the most convincing show. But you should have seen the way St. Louis, Chicago, Milwaukee, and a dozen other cities tried to get it!

You have seen the program in the latest issue of *Air Repair*. Last minute additions made it even better than outlined, and those who attended the sessions were very profitably rewarded with a wealth of extremely interesting information on many phases of air purification.

THANKS A MILLION!

The highly successful Annual Meeting at Cleveland was made possible through the generous financial support of the following industries:

Aerodyne Development Corporation
Allied Oil Company
American Steamship Company
American Steel & Wire Division, U. S. Steel Company
Apartment & Home Owners' Association of Cleveland
Bailey Meter Company
Bartlett & Snow Company, C.O.
Basic Refractories
Big Sandy-Elkhorn Operators Association
Breslove Separator Company
Brown Brothers Coal Company
Capitol Fuel Company
Canada Steamship Lines, Ltd.
Canton Stoker Corporation
Catalytic Combustion Corporation
Central Pennsylvania Coal Producers Association
Centrifix Corporation
Cleveland Cliffs Iron Company
Cleveland Electric Illuminating Company
Cleveland Fuel Equipment Company
Cleveland Twist Drill Company
Combustion Control Corporation
Combustion Engineering-Superheater, Inc.
Connecticut Power Company
Consolidated Engineering Corporation
Dayton Automatic Stoker Company
E. I. Du Pont de Nemours & Company
East Ohio Gas Company
Fahrland Fuel Company
General Motors Corporation
Fisher Body Division
Joseph Goder Incinerators
Harris Coal Corporation
Harshaw Chemical Company
Iron Fireman Corporation
Jones & Laughlin Steel Corporation
Kiener Coal Company
Laundry Institute of Cleveland
Mine Safety Appliances Company
Morse Boulger Destructor Company
National Malleable & Steel Castings Company
North American Coal Corporation
North American Manufacturing Company
Oglebay Norton Company
Ohio Nut & Bolt Company
Ohio Rubber Company
Osborn Manufacturing Company
Parker Appliance Company
Perma-Top Company
Pickands Mather and Company
Pittsburgh Consolidation Coal Company
Prat-Daniel Corporation
Republic Steel Corporation
Retail Coal Board
The Ric-Wil Company
Sahara Coal Company
Sheeler Coal Company
P. J. Shomer Company
Sinclair Coal Company
C. H. Sprague & Son Company
Spring Canyon Coal Company
Standard Oil Company
Superior Foundry
Tremco Manufacturing Company
United Collieries & Virginia Mining Company
Warner & Swasey Company
Warner Collieries Company
Weatherhead Corporation
Webb Coal Sales Company
West Virginia Coal & Coke Corporation
Western Pennsylvania Coal Operators Association
Western Precipitation Corporation
Will-Burt Stoker
D. W. Williams
Zone Coal Company



Some of the gay revelers at the Annual Banquet at Cleveland. The left photograph shows, left to right, Mrs. and Mr. F. E. Fleder, an attorney who was formerly with the Cleveland Air Pollution Control Commission; Frank Sinning, Allied Oil Company; Mr. and Mrs. LeRoy Diehl, of the Commission, and Mrs. and Mr. Sam Close, also of the Commission. Center photo shows Commissioner H. G. Dyktor, Warner Seely, secretary of the Warner & Swasey Company and chairman of the Citizens Air Purification Committee, and W. O. Everling, Director of Research, American Steel & Wire Division, U.S. Steel Company. Right photo shows the J. J. Repickys, J. Holan, the E. A. Henkes, Mr. and Mrs. W. Engelmann (he's with the H. K. Ferguson Company), and Mr. and Mrs. K. V. Ralston — all with the Cleveland Commission.

Dr. Robert A. Kehoe, the principal speaker, could not accept any day earlier than Thursday afternoon, just as the meeting was winding up. He flew from Chicago to Cleveland and delivered an astonishingly good address on the subject of *Health Aspects of Air Pollution*. As one member said who had heard Dr. Kehoe many times before: "That man just can't give a mediocre speech!"

Social highlight of the four-day meeting was the banquet on Wednesday night. It began promptly at 7:00 and was followed by a very amusing and entertaining floor show, which lasted until 11:00. Announcement was then made that dancing would begin and would continue until midnight. However, the dancers were so enthusiastic that they prevailed upon the band to play for an extra hour. And none of them missed the important Annual Business Meeting the next morning!

The hurry and bustle of leaving began around 5:00 Thursday afternoon. Hundreds were catching trains or planes or calling for their cars and driving off to their respective homes. Your Secretary had too much to do to leave that night, but as he piled the remnants of various kinds of literature, etc., into his car the next morning, he drove back to Pittsburgh with a heart filled with many pleasant memories of one of the finest meetings he has ever attended. Only after arriving home did he recall that it was Friday the 13th—a lucky day for him and the Association all the way around!

GOURMETS RECALL FINE FOOD AT CLEVELAND

THE CLEVELAND ANNUAL MEETING is only a memory now, but many of the members will never forget it, and particularly the good food they consumed while there.

And to some the finest offering consisted of the sauerkraut balls served at the Shaker Heights restaurant of Gruber's. Those of you who will want to remember this culinary delight will be interested in the recipe, brought to you with the compliments of *Air Repair*:

½ lb. lean, boneless ham; ½ lb. lean, boneless pork; ½ lb. corned beef; 1 medium-sized onion; 1 teaspoon minced parsley; 3 tablespoons shortening; 2 cups flour; 1 teaspoon dry mustard; 1 teaspoon salt; 2 cups milk; 2 lb. sauerkraut, cooked and drained flour; 2 eggs, slightly beaten; dry bread crumbs.

Put meats and onion through food grinder; add parsley. Blend well and saute in shortening until browned. Add flour, mustard, salt, and milk; blend. Cook, stirring constantly, until thick. Add sauerkraut and put entire mixture through food chopper. Mix thoroughly. Return to skillet and cook, stirring constantly until very thick. Cool. Form into balls about the size of a walnut. Roll in flour; dip in eggs; roll in bread crumbs and fry in hot, deep fat (370 deg. F.) until browned. Serve hot as an appetizer. Approximate yield: 90 to 100 sauerkraut balls.

CLEVELAND INDUSTRY AND SMOKE CONTROL

AIR POLLUTION poses perplexing problems, both economical and technical, according to a statement released recently by the Citizens Committee of Cleveland for Air Purification.

Yet, despite these difficulties, Cleveland has made substantial progress since 1946, and will continue to make it. This progress includes:

1. Reduction in city-wide air pollution deposits (soot, dust, cinders, etc.) from 38.2 tons per square mile per month in 1949 to 35.6 tons in 1950.
2. Since 1946, when the monthly deposit per square mile was 51.5 tons, air pollution deposits have dropped 31 percent.
3. A 50 percent drop in number of plants emitting nuisances from industrial processes in 1950.
4. Seventy-four percent less industrial smoke than in previous years.

Results Through Cooperation

Cleveland's air pollution control program places great emphasis on the achievement of results through cooperation, and this cooperation can actually be measured. The case histories include:

As part of a $75,000,000 program for expanding its productive capacity, Republic Steel Corporation has underway a new $20,000,000 coke oven plant. This installation signals the beginning of the end for all coke oven relics of the World War I era. They have been the heaviest producers of smoke, dust, and fumes in the Cuyahoga Valley.

This new battery is the first privately-owned addition to be built in Cleveland

since 1916. It will consist of 126 ovens, and is designed to be as smokeless as possible for an operation which, by its very nature, is the greatest of all the steel industry's dust-producing processes.

This means 50 percent less dust than is now made by coke ovens, the Citizens Committee stated. And the new ovens will reduce the abnormal operating load on the old coke plants.

A 75 percent reduction of smoke, soot, and fumes coming from the 75-oven battery operated by Republic was made possible by relining the doors and installing a new charging device.

Other Producers

Republic is not alone in its fight against air pollution. Cleveland's other two major steel producers have likewise made a number of improvements resulting in a substantial reduction of air pollution.

Jones & Laughlin Steel Corporation has built an incinerator for burning rubbish, an operation which was formerly performed out in the open. It has also equipped a blast furnace with a new dust collector, and renovated the company's sintering plant vacuum system, which has reduced smoke and largely eliminated the emission of red ore dust.

The American Steel and Wire Division of the United States Steel Company not only rebuilt an oven battery of its coke works, but also replaced old annealing furnaces with newer and more efficient equipment.

Robot Controls

Completely automatic apparatus has been set up by the Standard Oil Company (Ohio) at its No. 1 refinery boilerhouse stacks to prevent air pollution by eliminating smoke. The automatic controls have utilized more than 80 percent of the gases which would normally have burned in the flare stack, reported E. B. McConnell, Sohio vice president in charge of manufacturing.

Standard Oil further spent $25,000 to install the boilerhouse fuel system controls to halt smoke from normal operations. This sum was part of $271,000 already spent by Sohio for air pollution and fumes control at the Cleveland plant.

Chemical Industry Advances

The chemical processing industry in Cleveland spent approximately $229,000 in 1950 on an intensive air pollution prevention program. The companies included are E. I. du Pont de Nemours & Company, the Harshaw Chemical Company, the Glidden Company, the American Agricultural Chemical Company, the chemical products plant of General Electric, and the fertilizer plant of Swift & Company.

A new $1,000,000 contact process plant has replaced the former chamber sulfuric acid plant of du Pont's Grasselli chemicals plant. New controls were added in the phenol plant, and a hood collection and packed-tower scrubbing system was completed and put into operation in the muriatic acid department.

Harshaw has added numerous odor-fume controls to its processing operations, and at the Glidden Company a new alkyd resin unit has replaced a dozen varnish stacks. Fumes have dropped sharply; odors slashed over 90 percent by volume.

C. I. Verniaud, superintendent of Swift's food plant division, reported that ammonia discharges from the plant will stop with the installation of additional scrubbing devices. "We hope for 100 percent effectiveness of the new controls," he said. "Swift's has spent $20,000 in the past few years for fume nuisance controls, and we won't give up until we get the problem licked."

Foundries Pitch In

The Crucible Steel Company of America has a vibration suppressor applied to a 30,000-lb. shake-out which reduces vibration for heavier loads, attaining 90 percent elimination of dust formation. Even operating noises have been greatly reduced!

The Citizens Committee claims first place for Cleveland, on an industry-wide basis, for the number of cupola controls installed at the various foundries. Literally hundreds of tons of fly ash are recovered hourly by the control devices installed. The Ohio Overall Cleaning Company spent $150,000 two years ago to install a new boiler system to eliminate smoke and fly ash.

Good Neighbor Policy

In addition to the companies cited above, there are some 200 other concerns throughout Greater Cleveland presently engaged in waging war against air pollution. The list reads like an industrial *Who's Who.*

Lots of APCA-SPAA lapel emblems were sold at the Cleveland Annual Meeting. They make their wearers look better than ever, as this photo of Vice President Hunter proves. Get them while they last from the Secretariat at $3.88!

Thanks to dieselization, Pennsylvania Railroad trains no longer black out the downtown lake front with smoke. Neither do the Great Lakes fleet of tugboats throw a dense smoke blanket over the harbor as they guide giant lake freighters along the Cuyahoga River.

The Coal Producers Committee for Smoke Abatement has called Cleveland's air purification program "the most comprehensive of any city in the nation." Industry has helped to earn this accolade by spending $30,000,000 since 1946 for control devices and modern combustion equipment to eliminate many of the industrial nuisances with which Cleveland has been plagued.

NEW DIRECTORY

In order to have the latest information on the Association available for the Annual Meeting, the Secretariat prepared an up-to-date Directory, superseding the one which was distributed in November, 1951.

The list of names is mimeographed. If anyone desires a copy, ask Headquarters for it. A printed directory will not be issued until fall.

OUR AIR IMPROVES

by WARNER SEELY
Public Relations Vice President
Warner & Swasey Company
Chairman, Citizens Committee on Air Purification
Cleveland, O.

Condensed from **The Clevelander,** June, 1952
(A publication of the Cleveland Chamber of Commerce)

LONG A LEADER among those metropolitan communities for civic accomplishments and industrial achievements, Cleveland now is commencing to make a name for itself in a field which recently holds increased importance in public consciousness due to the universal quest for a better living environment.

That sphere of activity is smoke abatement and air pollution control.

Timely reflection of Cleveland's growing stature in this direction is found in the fact that our city this month was the site of the 45th annual convention of the Air Pollution and Smoke Prevention Association of America.

Some 400 public health officials, engineers, researchers, and others from more than 100 cities throughout the nation were here June 9th, 10th, 11th and 12th to attend the conference. They devoted themselves to examination and review of a mass of technical information covering every phase of air purification ranging from the utilization of more efficient fuel combustion methods and equipment to the application of scrubbing devices for odor and fume control.

In addition to Herbert G. Dyktor, Commissioner of the Division of Air Pollution Control of the City of Cleveland, host to the four-day parley, and Walter O. Everling, research director of the American Steel & Wire Company, convention chairman, a number of other Clevelanders closely identified with air purification participated in the program either as speakers or panel discussion leaders.

Results Through Cooperation

The convention brought into the spotlight, both nationally and locally, the results achieved here through cooperation by municipal governments and industry in curbing and controlling smoke and other air pollutants.

The anti-pollution problem is not new, nor is it confined solely to Cleveland; it exists in varying degrees in every American city of any size. But constructive efforts to solve this problem in Cleveland are relatively recent—as recent as 1946, in fact—when the City of Cleveland consolidated, for greater administrative and operating efficiency, its bureaus of industrial hygiene, industrial nuisances, and smoke abatement into one centralized organization, the Division of Air Pollution Control.

Almost simultaneously, the Citizens Committee on Air Purification was formed—it is an organization comprising some 40 members representing virtually all industrial, commercial and business interests as well as numerous civic groups throughout Greater Cleveland. Its purposes: To promote air purification by encouraging industry and commerce to recognize and remedy the problems of air pollution stemming from the operation of industrial plants and business establishments.

Mr. Seely

Early in 1946, the Committee arranged with municipal authorities for an atmospheric survey of the city to be made by the Coal Producers Committee for Smoke Abatement, a national service organization sponsored by the National Coal Association, with headquarters in Cincinnati and an agency recognized as technically competent to conduct such a study. The same organization re-surveyed Cleveland last year.

Better by 31%

Atmospheric conditions in seven "postage-stamp" areas were analyzed. Findings of these two surveys provide a reliable "yardstick" for measuring the rate and extent of the improvements effected over this five-year span.

The reports show that air contamination here has been reduced by 31 per cent since 1946, with the decline in both total concentration and emission of contaminants varying "from approximately 20 per cent in some areas to 50 per cent in others."

Terming this reduction "substantial," the Committee cited three reasons for this improvement:

1. Reduction of smoke emission and modernization of firing equipment in city schools, public buildings, and institutions. "The sincerity of the city regarding air pollution control is indicated by these improvements in city properties."

2. Cleveland industries have taken important steps toward correcting air pollution.

3. Cleveland's Division of Air Pollution Control, in particular its Bureau of Smoke Abatement, has done a thorough job of inspection; further, the Division has scored signal success in abating smoke and curbing air pollution through the cooperation of industry and others vitally interested in the air purification problem.

As to the future, the Committee also had something to say. Among its recommendations were these:

1. Continued modernization of firing equipment in city schools, institutions, and public buildings.

2. Elimination of the practice of burning rubbish on the lakefront through the installation of public incinerators.

3. Further effort by industry to limit more closely—and stop, wherever economically possible—emission of smoke, fumes, vapors, etc.

4. Expansion of inspection activity by Cleveland's Smoke Abatement Bureau to uncover new fields for additional industrial cooperation.

Air pollution poses not one but many problems. It involves many complex technical questions; to find the answers still requires considerable explanatory research. To these must be added certain economic considerations.

Space limitations preclude discussion of these factors, but boiled down, their net importance is this: Technically, many of the answers are known as far as more efficient controls for combustion products are concerned, but the question of their economic feasibility still remains due to unusual difficulties encountered in adapting plant or process equipment or the excessive cost involved in installing such controls.

A clearer idea of the cost entailed by air purification is the conservative "guesstimate" of the U. S. Public Health Service that to control the air pollution problem of all industries in the nation would run in the neighborhood of $5,000,000,000. In Cleveland alone, industry has spent $30,000,000 since 1946—$13,521,000 in the last three years—for modern combustion equipment and new control devices designed to reduce "neighborhood nuisances" resulting from atmospheric contamination. The 1951 figure was $7,106,000.

Concerns which have taken positive steps toward lifting the smoke screen and pollution cloud here include firms large and small, whose names are familiar and others whose are not. Here's a list selected at random:

Standard Oil (Ohio), Republic Steel, Cleveland Electric Illuminating, Jones & Laughlin, American Steel & Wire, du Pont, Harshaw Chemical, General Electric, Swift & Co., Industrial Rayon, Ferro Machine & Foundry, Weatherhead, Grand Industries, Hotstream Heater, Belle Vernon, Leisy Brewing; these are among some 200 firms manufacturing a long list of products ranging from cement to castings.

If Cleveland's experience has proven anything, it is the readiness with which leaders of commerce and industry accept the responsibilities of good citizens and good neighbors when approached with an invitation to cooperate rather than by dictation through the policeman's club. It has further exposed the crying need of both industry and science for standards of performance by which the success of air purification work may be measured. What is good? What is bad? What is tolerable? Such standards and intelligent reference thereto are essential if the first requirement of success—public support—is to be achieved.

MANAGEMENT LOOKS AT POLLUTION

by HENRY B. DU PONT, *Vice President*
E. I. du Pont de Nemours & Company
Wilmington, Delaware

Condensation of an address given before the Second National Air Pollution Symposium, sponsored by the Stanford Research Institute in cooperation with the California Institute of Technology, University of California at Los Angeles, and the University of Southern California. Held at Pasadena, Calif., May 5 and 6, 1952.

POLLUTION, whether it is of air or water, has no friends. Like sin, everyone is against it. Like sin, it is a problem, and one that is always with us to one degree or another.

Pollution is a problem which has grown up with us gradually, and it became recognized as an evil only when it had attained alarming proportions. It seems to me that both industry and the public are somewhat like the busy parent who suddenly finds that his growing child has acquired some bad habits. But it all happened so gradually that none of us appreciated how far it had gone until we were faced with stark reality.

Pollution, you see, is cumulative. A century ago, towns and industries were comparatively few, relatively small and well dispersed. What wastes were discharged into the air or into the nearest body of water caused little concern or did little harm to anyone. But as towns and factories grew in scale and numbers and became more concentrated, their wastes multiplied. The air in many localities became laden with smoke and fumes. River systems became unfit for any use but waste dilution.

Pollution Problem Everywhere

We must realize that the normal activities of living produce a large amount of air and stream pollution. Wherever we have had concentrations of homes and people, and the facilities to sustain them, we have had this common evidence of the fact—a pollution problem. The greater the concentration of people, the greater the problem; and also the greater the pressures for correcting it.

To a certain extent pollution has been a part of the price we have paid for an industralized society capable of supplying us with a high and ever-rising standard of living. The peasant villages of Europe are, perhaps, free of smog, just as they are free of bathtubs, Chevrolets, and

Henry Belin du Pont, a vice president, director, and member of the Executive Committee of E. I. du Pont de Nemours & Company, has been associated with the firm operated by his family since 1928.

He is a 1920 graduate of Yale University, did three years of post-graduate work in mechanical and aeronautical engineering at Massachusetts Institute of Technology, from which he received a bachelor of science degree in 1923.

Mr. du Pont served as a research engineer on internal combustion engines for General Motors Corporation for four years, then did financial work for Delaware Realty and Investment Company. He has been in engineering and research in the Du Pont company, rising to vice president and member of the Executive committee by 1939.

electric refrigerators. They are not as free of odors as some might expect, and they are certainly not free of disease, dirt, and poverty.

We Pay Penalty

So, in a way, we have paid a penalty for the kind of civilization we have built. But we do not agree that it is a permanent price we have to pay. We know that with the will to correct the situation and with proper effort and sufficient time pollution can for all practical purposes be eliminated.

We cannot, of course, expect that the air of Pike's Peak can ever be transplanted to downtown New York, anymore so than we could expect sunshine to be quite so bright anywhere else as in California. Practical abatement, however, is well within reach of most industries.

If we consider our thickly settled areas and let our imagination go back 100 years, we would see the land as the first arrivals saw it. The air was pure. The streams were clear and full of fish. The odors were the agreeable ones of the forest. We had ideal conditions; I am sure they prevailed in Southern California half a century ago.

There is one sure way of restoring those ideal atmospheric conditions. All that is needed is for all industry to shut down and for all the people to move away. Within a very short time, the pollution problem would be solved.

Orderly Approach Needed

Most of us would certainly regard this as a rather drastic step, somewhat like trying to eliminate the hazards from airplanes by shutting down important air terminals. What we need is an orderly approach to a mutual goal, recognizing that all of us want the same thing, and that the only difference of opinion lies in the methods through which we achieve the end.

Pollution brings strong public reaction, because it affects the individual personally. Nearly everyone has experienced at some time or another some annoyance or discomfort from pollution. Because of this, magazine and newspaper articles dealing with pollution have crystallized thought and action on a national scale.

People Want Cleanliness

The public's attitude was illustrated in a *Fortune* survey in March, 1950. *Fortune* asked people in Terre Haute, Indiana, to list the things an industrial company could do "to make you feel good about its being in Terre Haute." Sixty percent of those questioned picked the statement, "eliminate things like dust, noise, odors." This was considered important by more people than "provide playgrounds for children in the neighborhood" (46 percent), and "pay above average wages" (46 percent).

Unfortunately, emotion has played a very substantial part in pollution abatement to date. Perhaps that is quite natural. I can readily agree that a lady whose laundry has been specked by falling soot

is in no mood for rational discussion. Or that a householder whose freshly painted home has been marred with fly ash is unlikely to favor calm, objective measures . . . "There ought to be a law," they say.

It would be pleasant if the problem could be resolved so simply, but unhappily it is somewhat more complex. The fact is that pollution abatement not only involves a lot of intense study and hard work, but must represent a sort of economic compromise in which the factor of cost cannot be ignored.

Compromise Necessary

Residents of a community encounter economic compromise at first hand in any public control project, such as the cost of a sewage disposal plant. For there the price is paid directly by the taxpayer.

Industry, for its part, is striving to handle its pollution problem in such a way as to achieve the result without putting too great a strain upon the ultimate consumer, the public itself. Heavy expenditures add to the costs of manufacture.

So it becomes a matter of adjusting our desires to our pocketbooks, just as we must in buying a suit of clothes or a bag of groceries. In any given abatement case it might be possible to remove 90 percent of the impurities emitted from a stack at reasonable cost. But it would cost perhaps twice as much to remove 95 percent, and four times as much to remove 99 percent. The desired degree of perfection must be considered against total cost in making improvement.

C. A. Gosline taking photograph of a Du Pont stack emitting dense smoke.

Laws Alone Are Futile

We have passed laws controlling pollution and laws could be drawn ordering our air and our streams to be as pure as those of the forest primeval. Short of a complete shutdown, this would be futile, because even with the best treatment some residual waste remains.

Few people recognize that the only media available for disposing of this left-over matter are the air and the water. These are the natural media for disposal; you cannot do up your wastes neatly in packages and throw them out along the highway. They must eventually go into the air or into the water.

As our knowledge of treatment methods grows—and it has been growing very rapidly over the past 10 years—it should (become) increasingly possible to discharge wastes in small enough amounts and concentration so that they would bring offense to few.

Industry in recent years has awakened to its obligations with respect to waste disposal. I can think of no responsible corporation which would willfully be an offender.

There was a time when some manufacturers took a short-sighted view. If plant wastes killed fish in a river or fumes attacked vegetation round about, they were likely to weigh the economic value of the fishing industry or nearby gardens and orchards against their own and argue that the jobs and the goods provided by the plant were of greater benefit. Therefore, they said, killing fish or damaging fruit didn't matter.

Attitudes Have Changed

Management now realizes that quite aside from the social implications, pollution is bad business for industry itself. Today we go to extremes to make our plants clean and attractive. We build our walls and stacks with an eye to beauty as well as utility. We plant grass and trees. We try to provide inviting cafeterias and work areas. Pollution has no place in this pretty picture.

We know that in so doing, our employees will take pride in the place they work and do a better job. An attractive plant brings a better type of applicant to the personnel office and greater good will in the local community. And an attractive plant brings residential areas nearby, a convenience to us and to our employees. If we were to fill the air around us with fumes and dust, we would enjoy no such benefits in good labor and community relations.

Long-Range View

Today the industrialist who previously thought only in terms of fish or fruit would see considerably further ahead. He would see the benefits of improved long-range relationships outweighing immediate considerations.

He would see that the fishing industry downstream or the neighboring farms were not the sole measure of economic loss, but that pollution affects the whole community in the cost of its drinking water, recreational facilities, industrial and residential expansion, and so on.

He would see that as an important taxpayer and representative citizen he would have to bear his share of the community expense arising from pollution, as well as loss in public esteem.

I do not believe any management in its right senses would overlook these obvious facts. I cannot speak for industry generally, but I can say that our own company considers pollution abatement as one of its first responsibilities.

On new plant construction, our top management policy is to insist, before approval of the project is given, that all pollution problems be solved in advance. We have gone to such lengths as to send a crew of experts in natural history into a new plant site area to make detailed analysis and a record of the existing acquatic life in the rivers, so that proper protective measures can be taken.

Ahhh! Overfire air jets swing into action, reducing violation to zero.

MEMO TO MEMBERS

Those of you who attended the Cleveland Annual Meeting are familiar with the aims of the Board in expanding the usefulness of the Association and its Secretariat. There are so many jobs crying to be done which can't be done because of lack of funds.

John Hodges, your President; Bob Griebling, the Executive Secretary; Tom Wurts, Chairman of the Finance Committee, and Henry Hebley, Chairman of the Membership Committee, all stressed the fact that we need more money to carry on the work of the Association.

Won't you all think about sustaining membership possibilities in your communities? And, if you can interest municipalities in supporting the Association, by all means put in a word. And when you have a live prospect, let him fill out the application blanks which can be obtained from the Secretariat.

Let's see if we can't double our income by the end of the year!

Heavy Investments Made

Our company now has, in investment or authorized expenditures, nearly $25,000,000 represented in pollution abatement facilities. This figure is just about double what it was four years ago, and the proportion of our total investment so represented has gone steadily upward.

And we are certainly not alone in the chemical industry in our outlook: I know of 30 companies in our own field who have spent, in aggregate, an average of $5,000,000 yearly on capital investment and operating expenditures for pollution control devices.

As any doctor or any fire chief will testify, prevention is a great deal easier than cure, and it applies as readily to pollution abatement as to medicine or public safety. Therefore, enlightened managements today are trying to face the problem before it becomes a problem, and they are enlisting every contribution of modern science in doing so.

Not many miles up the river from my home, the United States Steel Company is building a plant that will be one of the largest in the world. I am told that they are making exhaustive meteorological studies of the area to guide them and are installing the most effective anti-smoke equipment yet devised.

They believe that the only discharge from the stacks will be an occasional cloud of white steam. The cost of pollution abatement equipment at this plant has been announced at $8,000,000. Here is a good case in which the doctor is at work before the patient is sick.

Studies Sponsored

The American Iron & Steel Institute is sponsoring an air pollution study that is believed will point the way to further gains in smoke abatement. Individual steel companies are spending large sums on abatement research and equipment. Smoke has long been almost synonymous with steel-making, but obviously the industry is not content to let it stay that way, any more than we in the chemical industry are willing to subscribe to the old theory that a chemical plant necessarily has a disagreeable odor.

In our company we have learned a great deal about treating industrial wastes, and in many cases the results have been gratifying. A few weeks ago some of our people staged a demonstration in which they passed around a bottle which gave off a violent odor of decayed fish.

They invited all visitors to have a sniff, and followed it by a second bottle in which the same waste had been "masked" or treated by aromatics. The fishy smell had been completely eliminated and replaced by a rather pleasant odor.

Compare with Safety

In the Du Pont Company, we think of pollution in much the same way as we think of safety. Our accident rate today is only a fraction of what it was a quarter-century ago, and even then it was regarded as excellent.

There are laws covering safety in industry, but the laws have been useful chiefly in setting standards and describing uniform procedures. They alone have not brought safety to the factory. Industrial development has done so, simply as a matter of good business practice.

The same can apply to pollution. Laws aimed at pollution abatement cannot bring clear air and water any more than safety regulations alone can prohibit accidents. Many of the laws established to control pollution are working satisfactorily wherever they have been well administered and where there has been real cooperation.

We have found that good results can be accomplished by working together with sincerity of purpose to find out what is reasonable and necessary, and then setting out to accomplish the goal.

Real progress in any pollution abatement program will depend on 100 percent participation by the industries and communities in the area. Wholehearted efforts on the part of a majority can be offset by the halfhearted effort and indifference of a minority.

Encourage Technology

Our greatest promise in abating pollution lies in giving full reign to advancing technology. As Americans have found in every field, it is invention and development, not legislation and regulation, that have proved our most reliable instruments of progress. The farm reaper was not invented because of legislation or land reform, yet it had a more profound effect upon agriculture than any law, before or since. Long before the Emancipation Proclamation the work of inventors like Whitney and Howe had doomed human slavery. Child labor was not abolished just by statute, but by productive machinery that made such work unnecessary.

We Americans have a way of working out our own destinies in our own characteristic manner. It is a manner which other nations have failed to understand, to their loss and our gain.

German scientists, formerly the best in the world, found difficulty in achieving results under edict from Hitler. Soviet scientists will, in the end, fail to keep pace with us for the same reason. In a land where people are free to reach out continually for something new and better, nothing is impossible.

HOST TO AUSTRIANS

THE CATALYTIC COMBUSTION Corporation, Detroit, was a recent host to the Austrian insulated wire and cable team of engineers brought to the United States under the auspices of the Mutual Security Agency.

The men came to see Catalytic Combustion Corporation's low temperature fume combustion process. While continuing effort toward air pollution control is being made by Austrian wire enamelers, emphasis is being placed on savings which result from converting noxious fumes to recoverable heat energy in a country where fuel costs are high.

A Scientist Views the Air Pollution Problem

by H. H. SCHRENK, Ph.D., *Research Director*
Industrial Hygiene Foundation
Mellon Institute, Pittsburgh, Pa.

A condensation of the material presented at the Second National Air Pollution Symposium, Pasadena, California, May 5, 1952.

THE AIR POLLUTION PROBLEM is concerned with the undesirable effects which are produced by excessive atmospheric pollutants. The effects are three basic types: (1) nuisance; (2) economic; and (3) health. Nuisance effects include too much dirt, unpleasant odors, loss of visibility, and eye irritation. Economic effects include soiling of rugs, draperies, linens, clothes; loss of merchandise in stores; discoloring of paint, corrosion of stone, mortar and metals, and injury to vegetation and livestock. These effects are well understood and will not be discussed further. Health effects, however, are much more obscure and deserve further discussion.

Health Effects

That air pollution can adversely affect health is demonstrated by the acute dramatic episodes in the Meuse Valley in Belgium in 1930; Donora, Pa. in 1948; and Poza Rica, Mexico, in 1950. However, chronic effects of atmospheric pollution on the general health of the populace have not been evaluated. There are many questions to be answered before we can attempt a valid appraisal. What is the effect of individual atmospheric pollutants on persons in relatively good health, including the aged and children? What is the effect of the simultaneous action of a number of substances? What is the effect on preexisting diseases, particularly of the respiratory tract? What are the effects on resistance to common diseases? What is the effect of the loss of ultraviolet rays? What are the psychological effects?

One does not need to have an intimate knowledge of the medical sciences to realize that these are difficult questions to answer. Some knowledge can be obtained by animal experimentation, but conventional toxicological procedures will need to be drastically modified or completely replaced by more fundamental physiological studies if significant results are to be obtained.

Dr. H. H. Schrenk, Director of Engineering of Industrial Hygiene Foundation, Mellon Institute, Pittsburgh, received his bachelor's, master's, and doctor's degree from the University of Wisconsin. His first position was with the state of Wisconsin, where he served as assistant toxicologist. For 20 years, from 1928 to 1948, Dr. Schrenk was associated with the U. S. Bureau of Mines in Pittsburgh, the latter 12 as Chief, Health Branch. Then he went to Washington as Chief, Environmental Investigations Branch of the U. S. Public Health Service. He was in general charge of the investigation at Donora, when 25 persons were assigned to the field team which made an exhaustive study of what happened during the fatal smog. The results, published as Public Health Bulletin No. 306, and entitled "Air Pollution in Donora, Pa.," are a valuable addition to the ever-growing literature on the problems caused by unclean air. Dr. Schrenk and his many professional affiliations are listed in "American Men of Science" and "Who's Who." He is the author of more than 100 papers published in governmental and technical journals.

Epidemiological studies also have promise, but again the most careful planning and critical interpretation of data are required if meaningful results are to be obtained. A definite contribution to this phase of the air pollution problem could be made by developing a sound program of future research. This would entail the cooperation of various professional disciplines and require the critical evaluation of each phase of the program.

Laboratory and field studies should be started only after the most careful and critical planning. Otherwise the results are not likely to be of any real significance. Regardless of the technical difficulties, the potential chronic effects of air pollution on the health of the general population must be determined.

Some may feel that the health effects have been overemphasized. It may be true that the other effects of air pollution far outweigh the health effects, but this should be determined on a factual basis and not by speculation.

Other Related Factors

Adverse effects may be produced by a single substance in the absence of other pollutants, it may be one of many pollutants, or the effects may be the result of the action of a combination of a number of pollutants.

The effects may result from a relatively slow action which is not immediately obvious but which, over an extended period of time finally is noted, as corrosion or accumulation of dirt. Other effects are immediately noticeable and occur intermittently for relatively short periods as loss of visibility, eye irritation, and unpleasant odors.

The intermittent effects are particularly important because they emphasize the wide fluctuation of air pollutants even though one may assume that the amounts of pollutants discharged have remained unchanged. This wide fluctuation, which is due to meteorological conditions, is of the utmost importance in considering control measures and will be discussed in more detail later.

What are the Causes?

Virtually every process or operation which produces gases, vapors or fine particulate matter is a potential source of atmospheric pollution. Combustion of fuel by plants, trains, boats, homes, trucks and automobiles, burning of rubbish, industrial operations, building and highway construction, are typical examples. An inventory of such operations is therefore an essential step in locating sources of pollution. There may be a tendency to overlook minor sources but a great number of small individual sources can more than equal a single large source.

The next step requires the determination of the kinds and amounts of pollutants disseminated in order to evaluate their significance. After the pollutants are disseminated into the air, they become a part of a gigantic dynamic system. They may react with each other or with other constituents which are normally present in the atmosphere to produce new compounds. If present in the gaseous state or as fine particulate matter they may be diluted and carried great distances by the winds with little or no evidence of their presence. If not diluted and carried away by air movement, they tend to accumulate and may reach levels which produce adverse effects.

It is evident that if we are to identify and determine the multiplicity of substances which can be present in the air under wide variations of weather conditions, we must have available a formidable array of analytical tools.

Although many such tools and analytical procedures have been developed for use in other fields, they have required and will continue to require drastic modifications to be applicable to the specific requirements of the atmospheric pollution problem.

Sampling Highly Important

Collection of the sample itself is highly important, for no analysis is better than the sample. The sample may be collected instantaneously requiring only a few seconds or it may be collected over a period of hours. But in either case it must be representative of the material sampled.

The purpose of sampling and the limitations of the analytical procedure to be used must be known before a suitable sampling method can be chosen or developed. Collection efficiency, alteration of composition and amount of material to be collected are other factors to be considered.

Frequent short sampling periods are more likely to give valuable results than long-time cumulative average samples. The short sampling periods are essential where significant changes in emission may take place in a short period of time.

The analytical procedures for individual samples may range from simple colorimetric comparison to the use of specialized procedures utilizing the principles of spectroscopy, x-ray diffraction, proton scattering, and electron microscopy. There is need for simple methods that require a minimum of apparatus and time for making routine determinations and at the same time there is a need for the specialized complex equipment for fundamental research investigations.

Specific Searches

In addition to the analysis of individual samples, continuous recorders have been developed for specific contaminants. Such an apparatus has many advantages. As stated previously the atmosphere is a dynamic system which is changing continuously. Thus a continuous recorder provides a complete picture of the changes which are taking place and at the same time provides a permanent record.

Much of the progress in air pollution is dependent on the development of good analytical tools. Lack of such tools has been a definite handicap in solving certain air pollution problems.

Interpretations

The results of the determination of the presence and concentration of contaminants in the air have no meaning unless they can be interpreted in some specific or relative terms. For example, a concentration of 1 ppm of compound X does not mean anything unless we know the effect of 1 ppm of compound X.

However, if the results of quantitative determinations show that there is an increase in complaints of adverse effects with increase in concentration of X, a correlation of concentration in terms of effects may be developed with due regard to other factors.

As an example of the results of research along these lines, a correlation of the injury produced in plants by exposure to various concentrations of sulfur dioxide for variable periods of time has provided information on condition of exposure which will and will not produce adverse effects.

With this basic information, it is possible to attach significance to the results of the determination of sulfur dioxide in terms of potential effects on plants. In other words, there are finite tolerance levels which do not produce adverse effects. This is of the greatest practical significance, for it makes possible the control of air pollution without the complete elimination of the pollutant which, in many cases, would be virtually impossible.

Correlations

To be meaningful, the results of the determination of contaminants in the general atmosphere also must be correlated with various meteorological elements such as wind direction and speed, temperature gradient, relative humidity, and rainfall.

For example, a typical curve of air pollution during the day usually shows a peak during the early morning hours when there is marked stability of the atmosphere. A minimum occurs in the middle of the day because of heating of the ground and resultant convection currents which carry the contaminants to higher levels where they are more readily dissipated by the winds.

These diurnal changes, however, are minor when compared with the more marked stable periods which occur from time to time, particularly during certain seasons of the year. The concentrations can vary manyfold depending upon the stability of the atmosphere. The wide range of concentrations encountered even though the amounts of contaminants discharged remains constant, indicates the significant role that meteorology plays in the air pollution problem. The important contributions that the meteorologist has made in recent years to this problem demonstrates that continued research in this field will yield valuable dividends.

Reduction of Air Pollution

If our evaluation of the effects, causative agents and meteorological conditions has been sound, then we should have a clear picture of what is needed to reduce the undesirable effects to acceptable levels. Some problems will be simple, others will be so complex that years of study will be needed to find a practical solution.

A problem may be limited to a single substance in a limited area while others may involve a multitude of contaminants in a large community. For example, the blackening of paint immediately brings to mind hydrogen sulfide.

Proof as to whether it was the causative agent can be readily obtained by chemical and physical tests. If there is a single obvious source, control by dilution, absorption, or combustion may be relatively simple. If the sources are many,

SUSTAINING AND COMPANY MEMBERS
as of June 20, 1952

SUSTAINING MEMBERS

Aerotec Corporation
Air Preheater Corporation
Allegheny County, Pa.
Aluminum Company of America
American Blower Corporation
American Boiler & Affiliated Industries
American Gas & Electric Service Corporation
American Smelting & Refining Company
American Steel & Wire Division, United States Steel Company
Anaconda Copper Mining Company
Atlantic Refining Company
Babcock & Wilcox Company
Bankline Oil Company
Battelle Memorial Institute
Big Sandy-Elkhorn Coal Operators Association
Bunker Hill & Sullivan Mining and Concentrating Company
Coal Trade Association of Indiana
Central Pennsylvania Coal Operators' Association
Chesapeake & Ohio Railroad
Cincinnati Gas & Electric Company
Cities Service Company
Cleveland Electric Illuminating Company
Coal Producers Committee for Smoke Abatement
Combustion Engineering Superheater, Inc.
Consolidated Edison Company of New York
Consolidated Gas Electric Light and Power Company
Deep Rock Oil Corporation
Detroit Edison Company
Detroit Stoker Company
Ethyl Corporation
Fletcher Oil Company
Fly Ash Arrestor Corporation
Ford Motor Company
Foster Wheeler Corporation
General Petroleum Corporation
Gulf Oil Corporation
Hancock Oil Company of California
Honolulu Oil Corporation
Humble Oil & Refining Company
Illinois Coal Operators Association
Iron Fireman Corporation
Jones & Laughlin Steel Corporation
Koppers Company
Norfolk & Western Railway Company
Northern West Virginia Coal Association
Ohio Coal Association
Ohio Oil Company
Operators Association of Williamson Field
Pennsylvania Power & Light Company
Philadelphia Electric Company
Phillips Petroleum Company
Pocahontas Operators Association
Potomac Electric Power Company
Prat-Daniel Corporation
Public Service Electric & Gas Company
Pure Oil Company
Republic Steel Corporation
Research Corporation
Reynolds Metals Company
Richfield Oil Corporation
Riley Stoker Corporation
Shell Oil Company
Signal Oil & Gas Company
Standard Oil Company of California
Standard Oil Company of Indiana
Standard Oil Development Company
Socony-Vacuum Oil Company
Sun Oil Company
Tennessee Products & Chemical Corporation
Texas Company
Tide Water Associated Oil Company
Union Electric Company of Missouri
Union Oil Company of California
U.S. Smelting Refining & Mining Company
U.S. Steel Company
Weirton Steel Corporation
Western Pennsylvania Coal Operators Association
Western Precipitation Corporation
Westinghouse Electric Corporation
Wilshire Oil Company

COMPANY MEMBERS

Airkem, Inc.
Allied Chemical & Dye Corporation—Barrett Division
American Air Filter Company
American Engineering Company
American Incinerator Corporation
Apex Smelting Company
Armco Steel Corporation
Atlanta Gas Light Company
Auburn Foundry
Aurora Gasoline Company
Baltimore & Ohio Railroad
Bituminous Coal Research, Inc.
William Bros Boiler & Manufacturing Company
Bubar Dust Systems, Inc.
Bureau of Industrial Hygiene, State of Pennsylvania
Burnwell Incinerator Corporation
Canton Stoker Corporation
Cleaver-Brooks Company
Columbia-Geneva Steel Division, U.S. Steel Company
Crucible Steel Company of America
Davison Chemical Corporation
Dayton Automatic Stoker Company
Dravo Corporation
Duquesne Light Company
Erie City Iron Works
Joseph Goder Incinerators
Grayson Controls Division
Robertshaw-Fulton Controls Company
Harvey Machine Company
Hilton-Davis Chemical Company
O. Hommel Company
Hoffman Combustion Engineering Company
Hotels Statler Company
Ideal Cement Company
Industrial Rayon Corporation
Jeffries Banknote Company
Johnston Brothers
Kaiser Aluminum & Chemical Corporation
Kaiser Engineers
E. Keeler Company
Mathieson Chemical Corporation
Monsanto Chemical Company
Morse Boulger Destructor Company
Mutual Chemical Company of America
National Tube Company
New Jersey Zinc Company
North American Aviation Company
Omaha Public Power District
Orr & Sembower
Pennsylvania Railroad Company
Plibrico Jointless Firebrick Company
Rothschild Oil Company
Rust Engineering Company
W. W. Sly Manufacturing Company
Smoke Abatement League of Hamilton County, Ohio
Southern California Edison Company
Southern California Gas Company
Standard Oil Company of Ohio
Stanford Research Institute
Stauffer Chemical Company
Strong-Scott Manufacturing Company
Superior Combustion Industries, Inc.
Toledo Edison Company
Union Iron Works
Valley Welding & Boiler Company
Wickes Boiler Company
C. K. Williams & Company
York-Shipley, Inc.

the solution becomes increasingly complex.

Unfortunately, few of our problems are so simple. The smelting industry has supported research for years to develop control measures to prevent injury to vegetation by the sulfur dioxide from smelter operations.

Much of the information available today on the effects of sulfur dioxide on vegetation comes from these studies. The same is true with regard to the efficiency of high stacks to cause the dilution of effluents at ground level.

An automatic sulfur dioxide recorder also resulted from these studies. Even though the contaminant, the source and type of effect were known, the extensive research required is convincing proof of the complex technical nature of the air pollution problem.

The problem of community air pollution is manyfold more complex; and each community has its individual problems. We may or may not know the offending agent. If we do not, the solution of this problem alone can tax the ingenuity of any research team.

Even if one knew each constituent and its exact concentration, it is very unlikely that the specific agent could be selected because of lack of fundamental information on the effects of many of the constituents. It would then be necessary to study the effects of constituents singly and in combination in the laboratory in order to ascertain the constituent or constituents which produce effects essentially the same as those produced by air pollution. Knowing the specific causative agent, the problem of control would still have to be solved.

There are numerous principles that can be utilized to control atmospheric pollution — dilution, change in process, transformation, gravitational and centrifugal separation, filtration, electrostatic precipitation, absorption, adsorption, and ultrasonic flocculation. Equipment that is satisfactory for one condition may not be satisfactory for another. Before there can be intelligent design of equipment, one must have a clear picture of the objectives to be attained. There are still many problems for which no economically satisfactory control procedure has been developed. There is need for extensive research and development in this field.

Research and Teamwork

It seems reasonable to expect that the same principles of research which have been responsible for the many industrial advances in recent years will be able to solve the technical problems of air pollution.

It can be definitely stated that the solution of the air pollution problem is dependent on research and engineering development. The progress that will be made will depend in a large measure on the extent to which industry and the public support future research.

This in turn will depend upon industry and the public having a clear understanding of the contributions that scientific research can make. First the public must recognize that a sound philosophy of air pollution control cannot be built on complete elimination of pollutants. It can only be built on reduction of air pollutants to acceptable levels.

A program which reduces unpleasant episodes from 30 to 40 per year to one or two, has certainly made commendable progress. It is apparently difficult for the layman to appreciate the individual nature of air pollution problems and the wide differences that exist. The acute episode at Poza Rica, Mexico, which was apparently due to a single substance from a definite source, cannot be compared to the complexity of the problems in the Meuse Valley, Belgium, and Donora, Pa., where a multiplicity of contaminants from numerous sources were involved. One city may make marked improvement in atmospheric conditions by smoke abatement, and citizens of other cities may expect the same rapid improvement; but they fail to recognize that their problem is not smoke abatement and probably is much more complex.

There must be close cooperation and mutual understanding between the scientist, the public, and industry. Only then can we have the intelligent approach which is necessary to eventual success.

RUSTING OF LOW ALLOY STEELS

A PAPER entitled *A Theory of the Mechanism of Rusting of Low Alloy Steels in the Atmosphere*, by H. R. Copson, research chemist of the International Nickel Company's research laboratory, Bayonne, N. J., gives some very interesting data on exposure tests in industrial and marine atmospheres started more than 10 years ago.

In industrial atmospheres, copper and nickel in steel render sulfate corrosion products more insoluble by forming complex basic sulfates. On mild steel, sulfates in the rust are relatively soluble and promote corrosion but are washed away by rain. On alloy steels the sulfates are less soluble so that corrosion is slower, but less sulfate is washed away and more accumulates in the rust.

The percentage of sulfates in the rust *increases* as weight loss *decreases*. At the marine location, severe corrosion of certain edges was due to soluble chlorides being swept to these edges by the wash of rain.

Authorized reprints from the copyrighted proceedings of the American Society for Testing Materials may be obtained by writing to the International Nickel Company, 67 Wall Street, New York 5, N. Y.

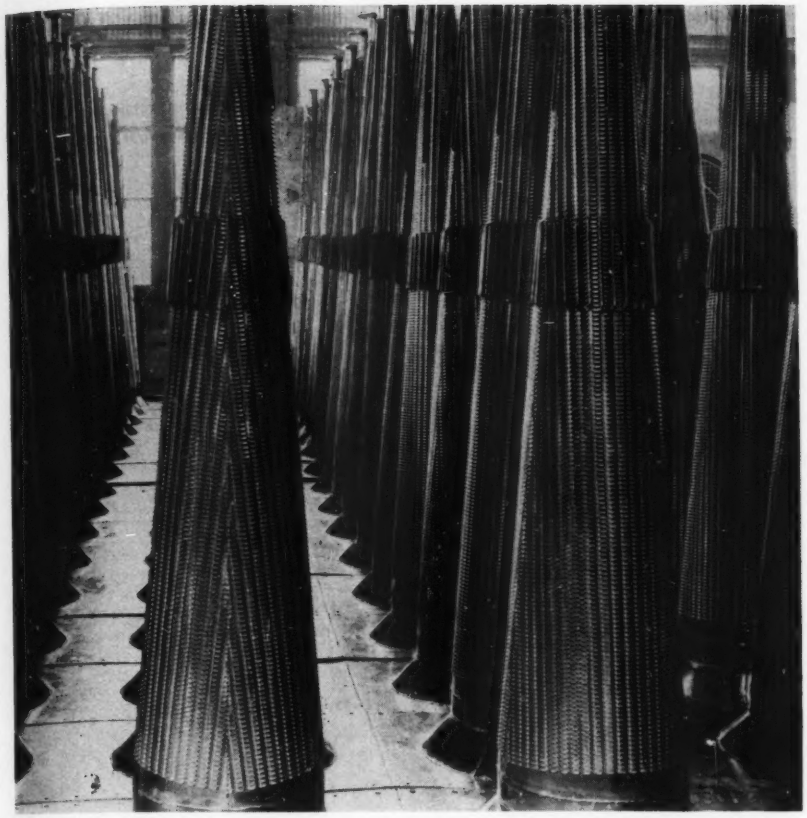
$200,000 MORE FOR SMOKE CONTROL

A NEWLY PROVED type of smoke control equipment, costing $200,000, is being installed in the Consolidated Edison Company's Hell Gate electric generating station in the Bronx.

It incorporates an entirely new idea in the technique of dust control, and has been available in the United States only since 1949. The Hell Gate unit is the largest ever built and will be the first in New York or any of its neighboring states.

The collector, brainchild of E. T. Linderoth, Stockholm inventor, consists of 64 hollow steel cones, each more than 10 ft. high. These cones are installed so that gases emerging from the boiler will enter the large end of the cone and emerge through some 2,000 slotted perforations in the sides.

The gas stream must change direction sharply in order to pass through the slots. It has been found that dust and ash particles are in many cases too heavy to make the sharp turn with the gas. These solid particles therefore continue through the cone to the narrow end, where they are separated from the gas and removed



Ten-foot high Aerodynes which are being installed in the Hell Gate electric generating station of Consolidated Edison Company in the Bronx. These dust collectors were built by the Green Fuel Economizer Company, of Beacon, N. Y., manufacturers of mechanical draft fans, air heaters, and economizers since 1892.

by the station vacuum ash collecting system.

Some particles are small enough to escape through the slots. These will still have to pass through the electrostatic precipitator before reaching the stack.

The new device is called an Aerodyne. An experimental unit was purchased by Con Edison in 1950 and found to be efficient. The decision then was made to install regular units in the Hell Gate station.

MEDIEVAL GERMANY FOUGHT SMOKE

AFTER READING all about Queen Eleanor of England and her famous move in 1257 A.D. from Nottingham to Tutbury Castle to escape the "unendurable smoke from sea-sole," we decided that life would be more bearable if we could occasionally refer to some historical date other than 1257, when the lovely queen made smoke news.

Sure enough, we had luck. The other day we came across some interesting references in *Rauch und Staub*, a magazine published in Germany from 1910 to 1933. Incidentally, the magazine had considerable merit, and it seems a pity that it could not have been published continuously.

The editors were on their toes, and reported not only the anti-smoke activity in Germany, but also in other countries, mentioning by name such organizations as the National Smoke Abatement Society of Great Britain, as well as the work done by the University of Pittsburgh.

The February, 1912 issue of the magazine listed the oldest known German injunction against smoke. It was passed in Cologne on June 11, 1461 and covered the complaint of neighbors around the copper and lead smelter of Thomas von Venrath, and the harmful fumes that emanated therefrom.

In 1464, three years later, he was ordered to cease and desist. He asked for an extension (they still do it today!), which was granted—but for one month only.

The silver smelters at Luebeck were forced to be constructed outside of town, so that the citizens would not be annoyed by odors and smoke. That was in 1492. And the record shows that the silver factories of Joachimsthal, Bohemia, were equipped with smelters having chambers for the entrapment of smoke and dust.

Most appealing of the old German smoke eaters was probably Johann Mathesius, a preacher who gave many a sermon on the subject of "wild poisonous smoke."

Since he had first-hand knowledge of mining and kindred activities, his sermons were considered historical contributions to the manufacturing of his time.

We give you herewith a free translation of part of a sermon he preached in 1562:

"Our Lord God is a wise housefather, because he knows that poor miners are exposed to bad weather, stench, cold dampness, and draw into themselves poisonous smoke. He (God) establishes next to the mine a common apothecary (Mathesius is referring to medicinal wells), so that the miners can have mountain medicine for clayey and mucous lungs, chilled stomachs, and crippled limbs, and whatever also is miserable."

Christoph Andreas Schlueter made some interesting observations on smoke control in 1738. He described the famous copper smelter at Neusohl in upper Hungary, where the dust is captured in a double-vaulted smelter, sprinkled with water, and set under the coals, layer by layer.

He also urged:

"It cannot be arranged that everyone in the factories can work without annoyance by smoke, but it should be planned that most winds do not hinder the work. Whether in valleys or on plains, the winds should be observed in time, so that their habits may be known."

It's good advice today!

RESEARCH PROJECT STARTS IN CHICAGO

Headed by Leedy of Armour

START OF a new long-term research project, to learn exactly where Chicago's dirt comes from, was announced by Dr. Haldon A. Leedy, director of Armour Research Foundation of Illinois Institute of Technology.

Cost of the program for the first year will be about $25,000, Dr. Leedy told the Midwestern Air Pollution Prevention Association, of which he is president. MAPPA includes engineers, industrialists, city officials, and others from the Chicago area interested in preventing local air pollution.

Three Phases

The new project will include three major phases.

First, a statistical survey, based on records kept by the city's Department of Smoke Inspection and Abatement, will be made to learn the factors responsible for past smoke violations. Data from case histories of violations will be tabulated and interpreted by statistical methods.

The department has in its files a large number of case histories on smoke violations, with information on each of these factors: type of plant, type and size of firing equipment, type of fuel, use of overfires or jets, smoke prevention equipment, operating conditions, number of reports and violations.

Statistical studies of such data should lead to definite conclusions as to factors responsible for smoke violations in Chicago. On the basis of these conclusions, educational and other reliable remedial measures can be planned.

Dustfall Studies

The second part of the project will consist of microscopic study of Chicago's dustfall to determine the source. Hundreds of samples from the Chicago area, including the suburbs, will be analyzed and classified as to contents and source by the Foundation.

Modern analytical methods based on light and electron microscopy, x-ray diffraction and spectroscopy, are able to characterize settled and suspended dust particles as to source. It is possible to classify the contents of a given sample by these techniques into categories such as:

Haldon A. Leedy, the 42-year-old Director of the Armour Research Foundation of Illinois Institute of Technology and President of the Midwestern Air Pollution Prevention Association, is a physicist of national reputation.

His professional activities include membership in the National Research Council, the National Noise Abatement Council, the Acoustical Society of America, the American Society for Testing Materials, the American Standards Association, the National Electronics Conference, and many others. He has headed various committees in many of these organizations.

Dr. Leedy has published a number of papers, mainly on problems in acoustics, in the nation's leading technical journals, and is considered an outstanding authority on acoustical measurements.

MAPPA can be congratulated for securing the active interest of this eminent technologist, whose guidance in the new Chicago research program will be so welcome.

Combustion products (smoke, soot, fly ash)—coal, gas, wood, oil, incinerators, backyard and alley burning of trash, internal combustion engines.

Dust and dirt—soil, sand, products of rust and corrosion, products of decay, industrial dust (foundries, lime plants, etc.), fibrous material (cloth, paper plant debris, etc.).

Proportions Determined

During the first year, Dr. Leedy estimates, Foundation researchers can determine the relative proportions of fly ash, minerals, and fibers in the air samples and settled dust samples around Chicago. They will also begin the long-term job of breaking down the sources of fly ash from many places.

The second phase is expected to take several years of study. It will include sampling from specific stacks during definite burning operations, followed by microscopic and photomicrographic study of these samples. Many samples will be necessary to cover the various fuels, types of equipment, and burning conditions.

As soon as results are available, MAPPA plans the third phase: an educational program. This will include publication of pamphlets on where Chicago's dirt comes from, and how to reduce it. Lectures will be presented before organizations which can help prevent air pollution.

The officers of MAPPA, besides Dr. Leedy, are: Thomas H. Buchanan, First Vice President; Charles Molnar, Second Vice President; Samuel Radner, Secretary-Treasurer. The Executive Committee consists of Vernon G. Leach, consulting and research engineer, Peabody Coal Company, Chairman; James R. Allan, Manager, Industrial Engineering and Construction Department, International Harvester Company; Oliver F. Campbell, Chief Combustion Engineer, Sinclair Refining Company; Clarence P. Fisher, General Manager, Chicago Union Station Company; J. R. Henderson, Chairman, Illinois Coal Producers' Air Pollution Control Committee; Dr. Raymond Hussey, Scientific Director, Council on Industrial Health, American Medical Association; B. M. Livezey, General Superintendent, U. S. Steel Company; W. L. McFetridge, President, Chicago Flat Janitors' Union; A. D. Singh, Consulting Engineer.

The Role of the Bureau of Industrial Hygiene in Air Pollution Control in Pennsylvania

by JOSEPH SHILEN, M.D., J. S. SHARRAH, and CHARLES D. ROBSON

WITHIN RECENT YEARS the problem of industrial air pollution has been looked upon as a possible hazard to community health and therefore the proper concern of public health agencies everywhere. In the Commonwealth of Pennsylvania this matter is dealt with by the State Health Department's Bureau of Industrial Hygiene.

Investigation and evaluation of air pollution problems arising from industrial sources was a routine part of the work of the Bureau of Industrial Hygiene, Pennsylvania Department of Health. No special equipment was used other than the equipment used for in-plant studies adapted for outside use. Air pollution arising from non-industrial sources was usually investigated by the Division of Environmental Hygiene of the Bureau of Health Conservation.

Following the much publicized Donora smog, increased emphasis for the study and control of air pollution by the citizens, governmental officials, and other agencies resulted in the Pennsylvania legislature establishing a Division of Air Pollution Control within the framework of the Bureau of Industrial Hygiene.

Work was immediately started to devise and procure instruments especially suited for this type of work. One of the simplest adaptations for conducting community environment studies was the modification of the vacuum systems of cars so that they might be used as pumps for impingers and other collecting equipment. Using flow meters or orifice meters, this procedure eliminated need for power to operate sampling equipment in the community.

One of the instrument recording trucks used in air pollution studies by the Pennsylvania Department of Health.

Seven District Offices

One of the advantages of evaluating community air pollution by state agencies is the excellent testing and analyzing facilities usually available to such agencies. The Bureau of Industrial Hygiene is well established, with seven district engineering offices strategically located throughout the state in industrial areas, two of which have reasonably well-equipped industrial hygiene laboratories.

A very well-equipped central laboratory is maintained by the bureau at Harrisburg. An important section of these facilities is a completely air-conditioned spectrographic laboratory equipped with a Bausch and Lomb spectrograph.

Notwithstanding the excellent laboratory facilities of the Bureau, it was felt that a mobile laboratory should be added. Such a mobile laboratory for on-the-spot analysis was custom-built by the Mine Safety Appliances Company for the Bureau. It was a modified route-van truck fitted out as a traveling laboratory complete with water and distilled water, bottled gas, sink, hot plates, chemical, dust counting, and field equipment, a motor generator for independent electrical power, and limited meteorological equipment.

During an air pollution survey, such equipment is conveniently used as a base of operations set up right within the community from which engineers in cars can travel forth to selected sampling stations or locations and return with the samples for immediate analysation.

Dr. Joseph Shilen, Director of the Bureau of Inaustrial Hygiene of the Commonwealth of Pennsylvania for the past 12 years, is a graduate of the George Washington University medical school. He was at one time in charge of the Tuberculosis Hospital in Pittsburgh and also engaged in private practice there. He is a member of county, state, and national medical associations, as well as the American Industrial Hygiene Association, the American Public Health Association, and the American Conference of Governmental Hygienists.

Special Meteorological Equipment

Inasmuch as meteorological conditions play an important part in the creation of air pollution, special equipment to evaluate such conditions during environmental studies was purchased. Perhaps most important of the meteorological measurements in any study is measurement of the wind speed and direction, and indication of wind gustiness. Therefore, a Bendix-Friez "Aerovane" wind speed and direction transmitter and recorder was purchased.

This equipment has been modified to make it versatile and mobile. The transmitter may be mounted on its regular support at a fixed location for extended community studies, or upon a special folding television-type support on the top of the instrument recording truck.

Connected to the transmitter by cable is an Esterline-Angus recorder of wind speed and direction. This recorder is mounted in a portable wooden carrying case and may be used away from the truck. Additional meteorological equipment consists of two large standard weather-bureau-type instrument shelters and several small wooden wall-type instrument shelters.

For use with these shelters, the bureau has a Bendix-Friez hygrothermograph and several Bachrach thermographs, as well as numerous thermometers. Using meteorological equipment as an example, one might consider at this point the disadvantages of mobility and the problem that a state-wide agency faces in making community environmental studies. Standard meteorological equipment is usually designed for permanent installation, but, for limited use in one location after another, modifications for portability had to be devised.

Knowledge Not Complete

It is quite evident that the knowledge of effects, the techniques of measurement and evaluation, and the acceptable standards of desirable and undesirable, harmful and non-harmful conditions of community atmospheric pollution is in a state of flux compared with the older and more established field of industrial hygiene.

For example, the measurement of the contaminant in community atmospheric pollution studies is usually more complex than in-plant studies in industrial hygiene practice. This is because of the multiplicity of sources and contaminants, the variability introduced by meteorological and topographical conditions, and the general lower range of concentrations experienced. This, then, makes evaluation of any industrial area an extended procedure; however, it has been the experience of the Division that most of the complaints of air pollution are localized in area and character and generally can be attributed to one or a few sources.

Length of Sampling Time

In industrial hygiene sampling the determination of average concentrations of contaminants is usually satisfactory to determine the probability of hazardous conditions. Where concentrations are very small, extended sampling time usually will collect analytically significant samples.

It might logically follow in air pollution evaluation that, with markedly smaller average concentrations, the sampling time be further extended, but this practice does not always successfully evaluate the complaint.

Air-borne effluents leaving the source become entrained at the time of release in the mass of air or eddy passing a source. Since pollution is primarily diffused by these eddies, this may make the

J. S. Sharrah, Chief of the Division of Air Pollution Control and Assistant Director of the Bureau of Industrial Hygiene, is a graduate of the University of Pittsburgh. He received his B.S. in chemical engineering in 1937, then took an additional four years of work in safety engineering and advanced chemistry. He is a member of various technical societies, as well as Theta Tau, an honorary engineering society.

average concentrations of minor importance, for the frequency of partially-diluted pollution in the eddy that pass through a given point and the limit of dilution within the eddy are of greater importance.

An example of this is in the case of sulfur dioxide fumigation from a single stack, such as often occurs in smelting operations. A ten to twenty-minute sampling for atmospheric concentrations of sulfur dioxide with the usual bubbler or impinger collection methods will, upon subsequent chemical analysis, often indicate the very low average concentrations of less than one part per million.

Also the average concentration in the complainant area, and even in the effluent path, may vary little from the background average concentrations found in a comparative industrial area. Yet, at times when the effluent reaches ground level through large-scale eddy diffusion with relatively little dilution (and this has been observed in our practice) concentrations are experienced which are sharply noticeable and elicit complaints.

Second Mobile Unit

As a solution to better evaluation of air pollution attributed to gases or toxic emissions from localized sources, consideration was given to obtaining recording sampling equipment which would show the variability of the contaminant con-

centrations in the complainant area. This line of reasoning prompted the purchase of our second mobile unit, one designed to house and transport such equipment.

This second unit is a truck with a Boyertown body containing a Thomas-type recorder used in the sampling of atmospheric concentrations of sulfur dioxide. This recorder is a modified design of the Leeds and Northrup autometer, especially mounted for mobile use.

This instrument will sample continuously and record the concentrations of sulfur dioxide in air on a chart. Concentrations existing for even less than a minute can be detected with ease and accuracy. Additional features of this machine are such that it automatically averages the concentrations found, then checks its operations with a standard each half hour.

The autometer also does not require constant supervision; however, we have found by experience that the best operation obtained from this equipment is when it is visited on the average of every eight or twelve hours.

Since machines of this type provide a better analysis of actual conditions, the bureau plans to use similar equipment for evaluation of other contaminants when available. At the present time an experimental modification of this machine is being undertaken to adapt it to simultaneously record total sulfur and sulfur dioxide in the same operation.

Collection Jars

When the Division was first organized, dust evaluation was made by electrostatic and liquid impingement methods. Such methods, acceptable in industrial hygiene practice, fall short of evaluating completely a community dust condition. Notwithstanding the improbability of health hazards of settled particulate matter, the public is concerned with industrial dust and fly ash as it is seen gathering on porches, cars, and wash lines.

Therefore, when pertinent, collection of settled samples is made in community air pollution evaluation. Collection jars strategically positioned for monthly periods is one method used; however, for quicker evaluation a dry collection method over a 24-hour period is also used.

Placement for fall-out sample collection by a state agency should be inexpensive, unobtrusive to the community, and easily accessible. We believe we have accomplished this by placing a shallow aluminum pan (moisture dish) in a wooden holder mounted on a large shelf hanger bracket attached to a utility pole approximately 14 feet above the ground. This height was chosen so as to keep the dish above a level that it might be maliciously disturbed and yet not too high for an engineer standing on the roof of a car to easily place or remove the dish.

The bureau plans to use wherever practical mensuration by automatic collecting or recording equipment. This is based on the premise that air pollution is a 24-hour a day proposition, highly variable from day-to-day, and often from hour-to-hour. With a limited staff and the statewide area to cover, the use of non-attended equipment seems most practical.

Pollution Control

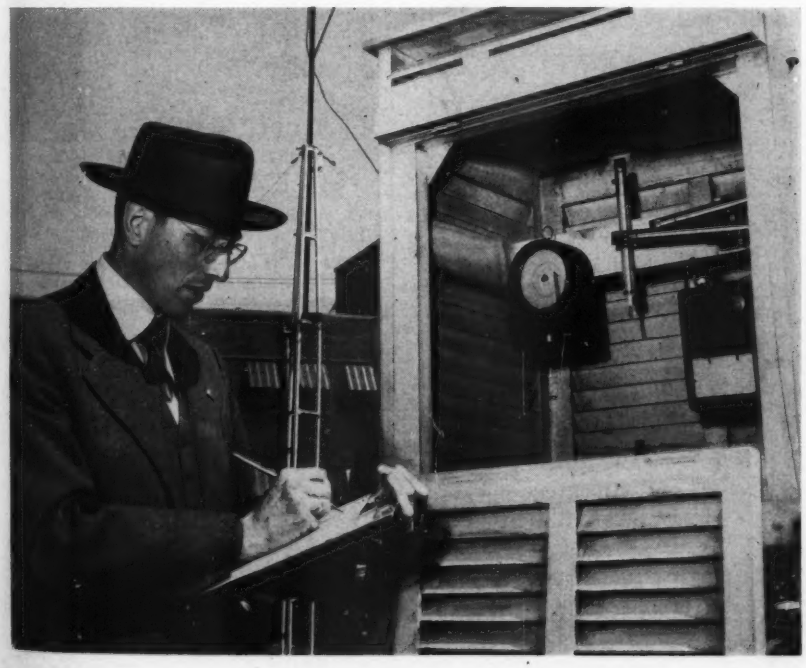
In Pennsylvania there is no state-wide air pollution law or qualified law for industrial exposure; however, there are rules and regulations governing public health nuisances. Such regulations prohibit noxious gases that are deleterious to public health to escape into the air; therefore, we are primarily concerned with the public health aspects of air pollution in its evaluation of air pollution conditions throughout the Commonwealth.

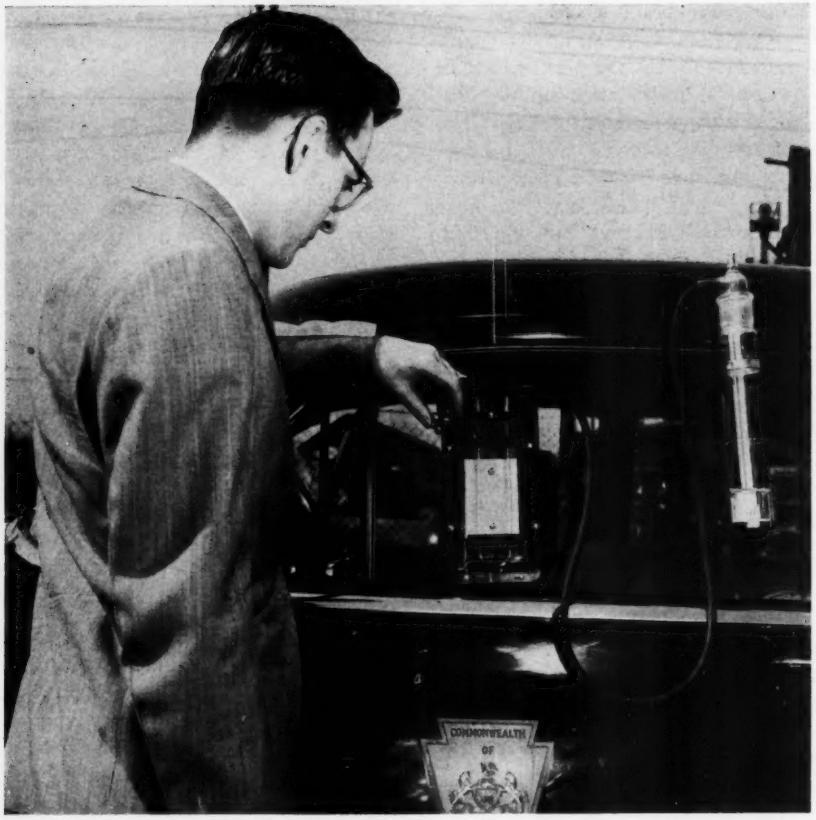
In practice this presents somewhat a legal paradox, for, while air pollution that is deleterious and detrimental to public health is prohibited, the standards defining same have not been established either by legal code or general acceptance in the field of air pollution investigation.

Practice within the bureau has been to base our recommendations after evaluation upon the accepted standards and experience of industrial hygiene. It is generally accepted that air pollution is usually a localized condition, and that its control should be at a local level. Unfortunately, however, air pollution conditions confronting the smaller municipal authorities cannot be properly evaluated by them because of inadequate facilities; therefore, for the satisfactory solution to air pollution problems utmost cooperation between the smaller municipal organizations and the state is desired.

In any community problem the role of a governmental agency should be that of

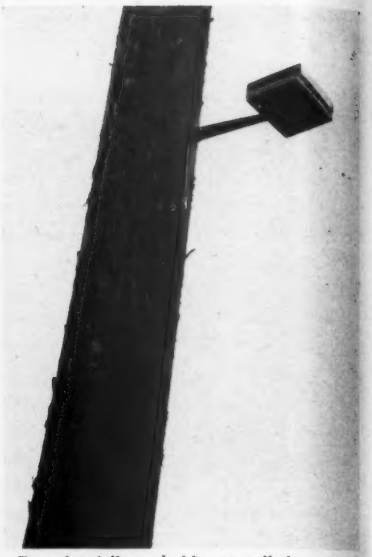
Meteorologist Charles D. Robson recording data to be correlated with air samples being collected in a given community. He has been associated with the state health department as an industrial hygiene engineer since 1946. A graduate of the University of Pittsburgh, Mr. Robson trained in meteorology at Massachusetts Institute of Technology and served as a weather officer in the army in North Africa and Italy during World War II. He is a professional member of the American Meteorological Society, and a national member of both the American Conference of Governmental Industrial Hygienists and the American Industrial Hygiene Association.





Collecting a sample of air in a community air pollution study using a mobile air sampler operated from the vacuum system of the department motor car.

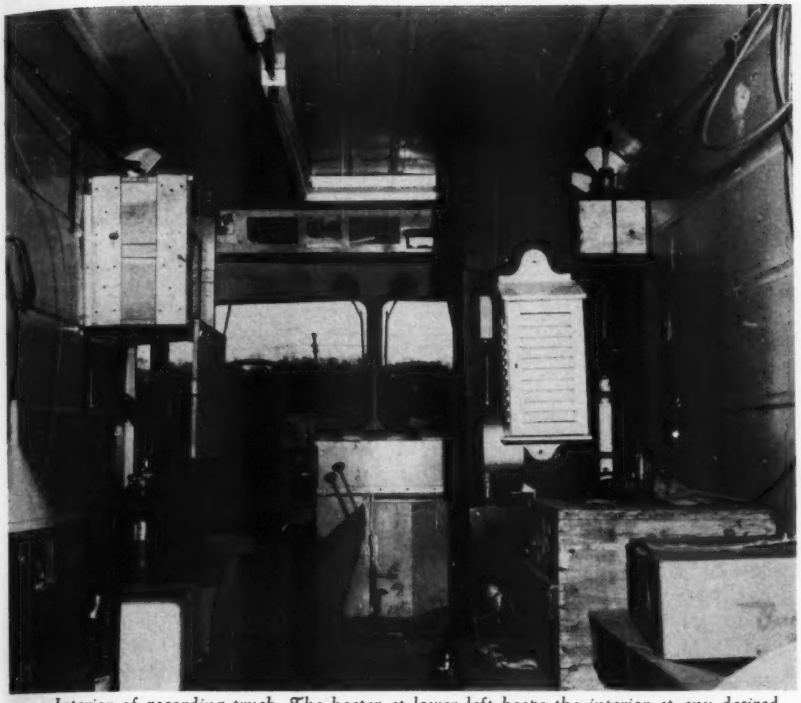
A section of the central laboratory of the Bureau of Industrial Hygiene, located in Harrisburg. The bureau also maintains district laboratories in Philadelphia and Pittsburgh.



Dry dustfall panholder installed on utility pole.

A soot fall collector, made of a gallon jug and an inverted lampshade, used in measuring degree of soot fall in air pollution studies. The wire is placed around the collector so that birds will not roost on the glass.

Wet dustfall jar, showing the manner by which it is mounted on a special support.



Interior of recording truck. The heater at lower left keeps the interior at any desired temperature in any kind of weather. Wind speed and directional recording chart at upper left. Upper right: rear view of autometer, which records sulfur dioxide concentrations. Center right: small meteorological shelter. Extreme right: blank wall, for installation of additional gas recording instruments. Dr. Shilen plans to install an automatic hydrogen sulfide recording instrument.

the broker between management and the public. Too often management is apprehensive of the cost of abatement of airborne industrial wastes or skeptical of its practibility. Too often it demands proof of its plant as causing air pollution or causing its proportionate share of air pollution. Often it is fearful of being sued for damages for any admittance of air pollution.

On the other hand, the public is too often misinformed or uninformed as to the true nature of air pollution, its source, and its effects. Most of the time, the public or individuals are fearful for their health. At other times you will find conditions where a group definitely is wanting damages as its main motive for complaint or air pollution.

Practice within the bureau has been, after an evaluation of the potential health hazard has been made, to attempt to convince management of its responsibility to the community in abating air-borne industrial wastes as much as is practical. Also, the factual and unemotional statement of conditions is presented to the public, usually through local municipal authorities. In the final analysis, in the absence of potential health hazards, the inconveniences and annoyances of industrial air pollution become a local problem which the local public must solve.

Research Plans

The Bureau of Industrial Hygiene is not a research organization; however, it is well understood that before the public health effects of air pollution are fully established much research is yet to be done. The bureau, in whatever environmental air pollution studies it makes throughout the Commonwealth, hopes to add to the knowledge from which the effects on public health by air pollution will be determined.

For the most part, the routine work of the Division of Air Pollution Control is answering complaints or requests for help in air pollution problems. These complaints may come from individual citizens, local municipal authorities, or as requests for aid from industrial management. Most of these complaints have been successfully evaluated; however, some conditions are still pending.

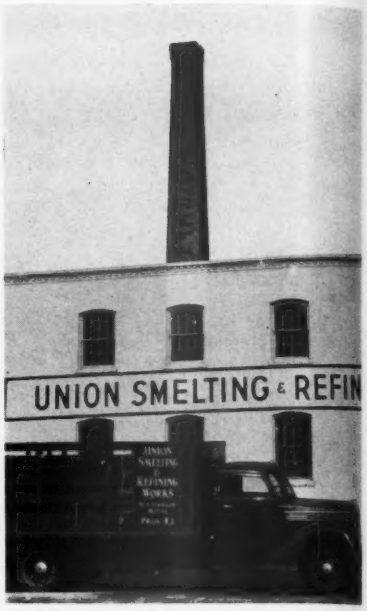
Complaints received concerning undesirable odors often are bothersome. One problem involved six months of investigational work covering processes and products of 25 different manufacturing plants. The source at the suspected chemical plant was finally established when it was discovered that an intermediate chemical found as a residue in the finished product produced an offensive odor, but only at a very great dilution. The material when smelled in bulk was odorless. This fact was discovered when papers and clothes used by the investigator produced the characteristic offensive odor when far removed from the plant. Even when referring to this case in the office file there was a faint odor noticeable among the field data papers.

Other Complaints

Several complaints of sickness were traced to toxic effects of lead fumes. In one case the effluent from a short stack from a cupola furnace melting scrap iron on certain days billowed over to the adjoining yard where workers were sorting waste materials.

Sampling in this junk yard showed high lead concentrations and even caused the investigator who had placed his sampling equipment in the path of the effluent to become ill. Investigation disclosed that much of the scrap had been heavily painted with lead-bearing paint.

Another complaint illustrates how the successful abatement of one source of air pollution may aggravate another. A pigment manufacturer had caused widespread dust in the adjacent community. After installation of a wet-type scrubber the pigment dust was successfully removed, but, where the effluent before was dry and hot and exited from a tall brick stack, the effluent was now much cooler and more corrosive. Because of corrosive action in the brick stack, a short wooden stack had been substituted, but now the public complained of the corrosive gases. These acid gases had been present in the previous unabated dust effluent, but, because of the high stack, the gases were relatively diluted and dissipated while the dust fell out in the surrounding countryside. Our recording equipment showed that appreciable concentrations reached ground level from the lower stack. This situation was improved when the wooden stack was increased to the old height.



Workers in the Union Smelting & Refining Company, Providence, R. I., load masses of wire into the smelter. Unburned matter, which forms thick smoke, is drawn from the smelter and blown into another burner where flames at 3,000 deg. F. burn the smoke. Note second photo, showing the clean stack of the Union Company, which formerly emitted dense clouds of smoke.—Photos Courtesy Providence Journal.

PUBLIC RELATIONS ASPECTS OF AIR POLLUTION CONTROL

by AUSTIN C. DALEY
Air Pollution Engineer
Providence, R. I.

An interesting point of view was presented last year at the 9th Annual Anthracite Conference at Lehigh University, Bethlehem, Pa. We thought it would make good reading for our members, and asked for permission to reprint it. This was graciously granted by Prof. Robert T. Gallagher.

—Editor's Note

SINCE, in most cases, American municipalities feel that they cannot afford to spend more than a pittance on air pollution control, the Air Pollution Engineer has to sell an extensive program of good public relations. It is his job to make the public conscious of the menace of contaminated air and enlist public support for his program.

This can be accomplished best through two channels, a sympathetic press and civic organizations. One can find out quickly if the press is in his corner, and once the newspapers' support is given it must be continued.

The Air Pollution Engineer must sell his program to the civic groups by speaking before them at every opportunity. Particular attention should be given to the women's organizations because it has been found that the so-called weaker sex, when aroused, will make a stronger and more effective fight for civic improvements.

Mechanical, technical, and fraternal organizations are very helpful, and it is nice to have them on your side, but groups of sincere, intelligent women, fighting for a good cause, are difficult to stop.

Difficult Problem

In Providence we had a difficult problem. Our city is one of the nation's most heavily industrialized, and one of the most densely populated, with a quarter million people living in an area of less than nineteen square miles. Nearly all our industries are potential sources of air pollution and the task was enormous, considering the fact that we had only three inspectors to do the job. Therefore, the people themselves were asked for direct help.

The local press heartily endorsed the campaign and called for citizens to become volunteer smoke spotters in order to give Providence a cleaner and more wholesome atmosphere. The Air Pollution Engineer became engaged in a busy speaking schedule throughout the city (and neighboring cities) with no group considered too small for a talk. Following the talks the floor was thrown open for discussion, and many problems were cleared up.

Listeners were told that the Air Pollution Division was ready to tackle any form of air contamination, whether or not the cause was covered in the original Air Pollution Ordinance.

The public soon began to call for assistance on dust, fumes, and odor problems as well as smoke. For example, many owners of parking lots began to dustproof their lots. Trucks carrying ashes, sand, rubbish, and soft coal began to cover their loads with canvas.

Chart Use Demonstrated

The first group approached was the League of Women Voters. Small Ringelmann-type charts were passed out and the women were shown how to use them. Soon afterwards the Air Pollution Division was regularly receiving calls from

the League, who phoned in names of violators and the date, duration, and Ringelmann density of the smoke. Inspectors followed up these leads and soon corrective measures were being taken by nearly all of the offenders. The League of Women Voters has shown a vigorous and sustained interest in the air pollution control program and is its strong right arm in Providence.

On speaking engagements we have tried to stress the fuel dollars wasted and property damage caused by smoke. One of our most effective educational devices has been a simple, old-fashioned, oil lamp rigged up with a bi-metallic thermometer. When the lamp is made to smoke, the temperature drop is clearly shown, and this is a graphic and dynamic method of illustrating the wastefulness of smoke.

Health Menace?

As to the health menace of smoke, the Air Pollution Engineer leaves that topic to the members of the Rhode Island Medical Society, who have been enthusiastic in their endorsement of our program and in their condemnation of smoke as a detriment to health.

One objective has been to achieve a balance between voluntary cooperation and good will and the stern alternative of disciplines and fines. So far we have enjoyed good results with the pleasant approach. We have found it necessary to take only two violators to court and both, after eliminating their sources of air pollution, are good friends of this department.

When this office notices or hears of a smoke violation we try to correct the trouble at its source. If we find that an owner has defective equipment we try to assist him in getting it repaired. The resultant fuel savings have won over many people in support of our program.

However, for well over a year we observed that over 50 percent of our recorded violations were caused by the hand-firing of bituminous coal. We visited a tremendous number of these installations and always found that the smoking was caused by improper firing methods or that the boiler was originally designed for anthracite coal.

Took Steps

This office began to take steps in an attempt to remedy this nuisance. Attempts were made to educate firemen on the proper hand-firing of soft coal. However, we made no progress when we tried to persuade offenders to abandon the use of bituminous coal in boilers designed for anthracite. The owners objected to the increased cost of the larger anthracite sizes, but at the same time would not consider grate changes in order to burn the lower cost bituminous.

We made an appeal to the bituminous coal dealers for an educational program for instruction on proper hand-firing and a clinic was held. National authorities on bituminous coal came and lectured at the well-attended conference. These authorities argued that no restrictions should be placed on the hand-firing of bituminous coal, regardless of the volatility of the coal.

At this conference the Air Pollution Engineer announced that his office planned to place a limit on volatile matter of 20 percent for hand-fired bituminous coal. This limitation was patterned after a similar one used in St. Louis and that city won world-wide fame for its smoke abatement.

"Un-American!"

This announcement caused a furore and cries of "un-American and undemocratic" restrictions went up. However, this department stuck to its guns and following procedure laid down by the Providence Air Pollution Ordinance, the ruling was announced in the local press and a public hearing was held.

The bituminous coal dealers came with legal and technical advisors and spokesmen, while the Air Pollution Engineer had to depend on the citizens, who came in good numbers. Good public relations paid off and the 20 percent ruling went into effect.

However, the smoke nuisance from hand-fired soft coal boilers continued. Bituminous coal, even of a lowered volatility, can still smoke when improperly fired and this department found, after continuous samplings and analyses, that the 20 percent limitation law was being continuously and flagrantly abused. Coal away above 20 percent volatile matter was being delivered to hand-fired installations. We prosecuted successfully, but we felt that the time and expense of laboratory and court for the prosecution

Austin C. Daley

of all violations would be prohibitive. In the meantime we could not find one hand-fired soft coal boiler (including those of bituminous distributors) that was not a chronic offender!

Gigantic Task

The task of policing and correcting these violations became gigantic and discouraging.

For instance, we would visit a rooming house and ask to speak with the fireman. An aged lady, with mop in hand, would announce that, in addition to all household chores, she also kept up the steam. We failed to comprehend as to how the dealers could educate this old woman on proper hand-firing while evidently they could not correct the belching hand-fired stacks in their own yards. We began to doubt that even their experts could do all the house work in a multi-story rooming house and operate the old boiler successfully.

The story was repeated in laundries, factories, and public schools. Some janitors were attempting to keep fairly large schools ship-shape in addition to firing run-of-mine coal in boilers which were decades old.

Obviously more rigid steps were in order and, after a lengthy conference with the Air Pollution Advisory Board (a group of citizens including two professional engineers, a physician, a lawyer,

and a councilman) a ruling was passed requiring that hand-fired boilers be fired with either coke or anthracite.

End Smoke Evil

We were convinced that this was the only real solution to the hand-firing nuisance. Both coke and anthracite have extremely low volatility, and it is impossible to make the latter smoke under any conditions.

This would end the smoke evil in these installations and, despite faulty equipment and inattention, these two fuels could not violate. Neither could they cause smoke or heavy, offensive fumes.

Once more a public hearing was held, and this time we found that we had a real fight on our hands. The bituminous distributors banded together and claimed that the ruling would cause economic hardships to their business. This office disagreed, because after taking their estimate of the soft coal sold for hand-firing, it was clearly shown that it constituted less than one percent of the bituminous coal brought into Providence.

Unpleasant

This hearing had a particularly unpleasant note. The dealers brought in as their only speaker one of their best known representatives, who travels the country for their cause. This man does not hesitate to attack the intelligence, professional ability, and even the integrity of air pollution officials who differ with him on how to run their programs. These tactics have worked in other cities, so they were tried in Providence.

Once more our office had to call on the people for support. The hearing was held in June, and many friends interrupted their vacations to come back to support us. The hearing was held in a packed City Hall council chamber.

The turnout was most gratifying. Spokesmen were there from such outstanding organizations as the Rhode Island Medical Society, the Consumers League of Rhode Island, the League of Women Voters, and the Rhode Island Federated Garden Clubs. In addition several civic leaders voiced approval of the new ruling.

Scheme Didn't Work

The speaker for the distributors talked for over an hour. He followed his usual procedure, but this time it did not work. Public opinion was solidly behind us.

This episode is related not in a spirit of bitterness, but rather as an illustration of how important good public relations are when the Air Pollution Engineer needs assistance against strong and experienced opposition. The people of Providence had become convinced that their Air Pollution Division was working for their welfare, and they were willing to fight for their right to breathe clean and wholesome air. Spirit like this can be created only by telling your story directly to the citizens.

Following the hearing the dealers carried their fight to the Air Pollution Appeal Board, which is composed of a group of professional men, the same as the Advisory Board. Public interest was keen

.. PEOPLE ARE NO DAMNED GOOD

The Critic

also at this hearing and the dealers' appeal was turned down.

Spotless Stacks

This winter we had an opportunity to watch the effects of the new ruling and all observers have agreed that it is an outstanding success.

The public schools, once bad smoke offenders, now have spotless stacks and the janitors express a decided preference for anthracite in hand-firing.

The Providence County Court House was once a regular "Stromboli" with its heavy clouds of black smoke from the hand-fired bituminous coal. This year it has a "new look" and its perpetually clear stack has won praise in the R. I. Medical Journal.

The State House boiler room, once a bad offender, now is also a spotless performer and its firemen swear by anthracite. They express delight over the clean tubes which now require only infrequent rodding.

The field engineers of the Anthracite Institute have been a great help in educating firemen in Providence on the proper use of anthracite.

The clean stacks of the old offenders have made many people wonder if those boiler plants were shut down this season.

Cost Comparison

A pleasant discovery has been the favorable comparison of cost in burning smokeless anthracite and the past expenses for the inefficient consumption of soft coal. In many cases the costs are fairly close, even with the larger sizes of anthracite. Next year some plants plan grate changes for burning small size anthracite which will actually lower their fuel costs.

The Providence Air Pollution Division wishes to make it clear that we have no preferences or prejudices as to types and grades of fuels. We merely want to see them burned properly and, of course, that means without smoke.

Just outside and below our office window are several stacks from boilers using stoker-fired bituminous coal and they seldom if ever violate. These owners are firing their bituminous coal efficiently and the happy results are a saving in fuel dollars and no smoke to plague their neighbors.

This new ruling enables us to keep the human factor down to a minimum in correcting smoking boilers. In the past we would educate a fireman on proper hand-firing only to find that in a short while he had been replaced by someone who had neither knowledge of nor interest in the task. Today the hand-fired plant can't smoke.

Oil Troubles

When we find a smoking oil burner or stoker the trouble is usually with either the fuel or mechanism and the trouble can be quickly and permanently corrected.

We don't, as some of our critics charge, offer this ruling on hand-firing as a panacea for air pollution. Smoke is just one part of air pollution. However, we feel that ruling was a vital step in our steady battle to clean up the air that the citizens of Providence must breathe.

That we are winning our fight can be attested from articles in medical publications, a survey conducted by a nationally

known magazine and a continuously laudatory local press. Perhaps our nicest accolade was a large congratulatory advertisement, which was run for several days in the local papers and was conceived and paid for by a Providence bank.

Don't Abandon Permits

Recently there seems to be a strong movement circulating to turn public opinion against controls on fuels and fuel burning equipment. Spokesmen for some organizations not only are against restrictions on fuels, but express strong views against giving air pollution authorities the right to inspect new installations. "Let them put in anything they want and then fine them if they smoke," is their motto. To us this is analogous to abandoning the building permit system, allowing any type of jerry-built construction and then fining the culprit after the building has collapsed and killed people.

The advocates of such procedure usually present their views in an aura of "sacred American freedom." Some years ago we heard the same protest against "violation of rights" when landlords of multi-story, wooden tenements were forced to alter their firetraps in order to save lives.

Experience here in Providence has shown that air pollution cannot be corrected solely by persuasion and cajolery. The administration of a good air pollution control program requires a sound authoritative system of permits and fines, similar to those that are vital to the proper functioning of a Building Inspection Department, an Electrical Inspection Department or a Health Department.

In our opinion most air pollution codes that we have studied do not have enough authority and should be strengthened rather than watered down. The engineers attempting to administer these codes have a difficult job on their hands and their task will not be made easier by the propaganda for weakness voiced by certain selfish groups.

These groups usually have powerful backing and can make things unpleasant for the Air Pollution Engineer who is sincerely trying to do a job. Their campaign will be effective and will stymie his efforts unless he enlists the support of a more powerful group—the citizens of the city which employs him.

Ripley's—Believe It or Not!
BINGO in England IS CALLED HOUSIE HOUSEY
THE ELEPHANT IS THE ONLY ANIMAL WITH 4 KNEES
THE MEN WHO GO SAILING IN TUBS
Wuhu, China
BEGGARS PADDLE OUT TO MEET STEAMERS ON THE YANGTZE RIVER IN WOODEN WASHTUBS!
THE STRANGEST ARBITER OF FASHION IN HISTORY!
Modena, Italy
A MARBLE STATUE BUILT IN 1473 AS A LEGAL YARDSTICK OF THE MAXIMUM LENGTH AT WHICH LADIES COULD WEAR THEIR DRESSES!
THOSE WEARING LONGER TRAINS WERE PUNISHED FOR STIRRING UP DUST
Copr. 1952, King Features Syndicate, Inc., World rights reserved. 5-14

DUST RAISER — An odd and singular marble statue, destined by law to serve as a model to measure the length of women's skirts, was erected in 1473 in Modena, Italy. By special ordinance it was obligatory for all women to model themselves after the length of the statue's dress. If a lady's dress was longer than that of the statue, she would be hauled to the base of the statue, and there she and her husband — if she had one — would be severely punished for stirring up the dust on the walks and thus endangering the health of her fellow citizens.

Events of the past few years have shown conclusively that there is no more important factor in a successful air pollution control program than the friendship of the housewife and the man on the street.

CHRISTY FINES SMOKY SHIPS

AFTER giving due warning to various steamship lines to observe the anti-smoke regulations of New York, William G. Christy, Director of the Bureau of Smoke Control, took the *Ile de France* of the French Line and the *Rio de la Plata* of the Argentine State Line into court and accused them of violating the ordinance.

Both vessels entered a plea of guilty and were fined $25, the minimum under Local Law 5/49.

Christy's department will make additional checks on vessels entering New York harbor if it can obtain the use of a launch to carry its work to the ships.

With a launch, the inspectors could follow a suspected vessel into the upper bay, the Hudson River, the East River, or in the Harlem River, where tugs and cargo lighters travel.

Mrs. Florence Gretz, representative of Lansdale, tweaks the beard of Claude Fogleman, of Northampton, who is helping his community celebrate its sesquicentennial. Executive Secretary Griebling looks on. All three attended the Pennsylvania State Boroughs Association meeting in Pittsburgh.

BOROUGHS ASS'N HEARS PANEL ON AIR POLLUTION

AIR POLLUTION problems as they affect boroughs were discussed at length by a panel of four speakers at a meeting of the Pennsylvania State Boroughs Association held in Pittsburgh late in June.

The panel was made up of Thomas C. Wurts, Director, Allegheny County Bureau of Smoke Control, Dr. H. H. Schrenk, Director of Research, Industrial Hygiene Foundation, G. A. Howell, Assistant to the Chief Engineer, Manufacturing Division, U. S. Steel Company, and Robert T. Griebling, Executive Secretary, Air Pollution & Smoke Prevention Association of America.

Mr. Griebling led off by reciting a brief history of air purification activities, then asked Dr. Schrenk to state the problem from a scientist's viewpoint. He was followed by Mr. Wurts, who described the actions which had to be taken on a countywide scale to bring proper legislation into effect.

Mr. Griebling then asked Mr. Howell, as a representative typical of industry—the offending agent in so many cases—to state industry's case. Mr. Howell said:

"Industry's approach to the problem has been cooperative. Industry realizes that it has a moral obligation, if not a legal responsibility, to the residents close to its plants.

"Where methods of improvement are known, steps were taken *prior* to the enactment of the present smoke control ordinance to improve atmospheric conditions such as installing gas cleaning equipment, automatic stokers, and incepting a long-range replacement program of rolling stock with Diesel or Diesel-electric units.

"There remain, however, certain air pollution problems pertaining to metallurgical furnaces such as open hearths, blast furnaces, and Bessemer converters. A rational approach will solve these problems in an orderly and economical manner.

"The complexity of research problems on the control of emissions from metallurgical processes is well known and has involved many man-hours of work of skilled technologists in time-consuming studies to seek and develop solutions.

"In order to further expedite research programs, certain steel companies within the county pooled their forces to conduct studies on air sampling methods and the composition of emission particles.

"Manufacturers of stack dust collecting equipment are attempting to improve their equipment, and are experimenting with various methods to collect dust entering stacks. However, in most instances, space limitations and reconversion of old equipment involves prohibitive expenditures to meet the necessary requirements to eliminate pollution entirely.

"How soon cooperative studies by industry and equipment manufacturers can be completed is problematical since definite answers must be found prior to full-scale installations. A pattern may be developed which would be the basis of all atmospheric pollution abatement, as well as legislation in other steel producing centers.

"There can be no such thing as push-button smoke control in industry, because each type of facility as heretofore mentioned represents an individual requirement for study, and particular units of a type present their own special problems."

END OF SMOG?

Reprinted from TIME, June 9 issue
Copyright TIME, Inc., 1952

UP TO the roof of Enamelstrip Corp. in Allentown, Pa., last week clambered Lehigh County Judge John H. Diefenderfer. There he sniffed suspiciously at the company's chimney. For months, nearby residents had been after an injunction against Enamelstrip as a public nuisance for the stench given off by its ovens (which bake enamel on to metal at 500° Fahrenheit). Judge Diefenderfer, after several judicious sniffs, said: "I can't smell a thing."

At this, a spectator on the roof, Eugene J. Houdry, 60, smiled proudly. In the late 1930's French-born Inventor Houdry made himself a millionaire, and created one of the biggest single advances in the oil industry's history, by his invention of the Houdry process of "catalytic cracking." (Which made it possible to get more and better gasoline out of crude oil.) Now, Inventor Houdry had taken the stench out of Enamelstrip's ovens with some new catalytic magic performed in the company's chimneys.

The results, reported Enamelstrip's General Manager Arthur E. Uhleen, are almost too good to believe. The original purpose, to eliminate odors and other pollution, proved to be merely incidental to a big increase in the whole plant's effi-

ciency. Not only odors but energy in the form of heat was going out the chimney. Houdry's catalytic units are capturing and saving it, so that Enamelstrip's gas bill has been cut by 90%.

More Energy

Houdry's process is quite simple. The catalytic units are arranged in layers in the chimneys, and each unit has 73 porcelain rods coated with a thin film (only .003 in.) of alumina and platinum alloy. This coating is the catalyst, which combines with oxygen in the atmosphere to burn up noxious wastes, and in so doing generates still greater heat.

This heat is channeled back to the original furnace and thus cuts down the use of fuel. The installation cost Enamelstrip $16,000, but fuel savings alone will pay this cost within six months. Enamelstrip, which was spending $3,000 a month on gas before the units were installed, is now spending only $300. Said Uhleen: "We're getting so much heat out of them that we're throwing a lot of it away. We plan to heat the whole plant with part of the excess."

Inventor Houdry has formed a company, Oxy-Catalyst Manufacturing Company, and rented a plant at Wayne, Pa., to turn out the catalytic units.

Less Smell

As for potential uses, Houdry thinks that his new catalytic process can clear the industrial smog from U. S. cities, enable notorious offenders (*e.g.*, New York City's Consolidated Edison Co., which generates electricity from coal) to make immense savings in fuel. Moreover, the oil industry, which has to burn oil to generate the heat needed to refine petroleum, also can make big savings. Houdry estimates that a petroleum cat-cracking unit could save $320,000 a year in fuel by installing 12,000 of his units. Joseph N. Pew's Sun Oil Co., one of Houdry's original partners in his cat-cracking, is now installing the new Houdry process at a cracking unit in Marcus Hook, Pa. Houdry himself thinks one of his biggest potential markets is in the 5,700,000 home oil burners in the U. S. By the use of six of his units (eventual cost: $30) he estimates the burners could be made 100% efficient, save up to 40% of their annual fuel consumption.

INDUSTRIES IN ALLEGHENY CO. SPEND $200,000,000 ON AIR CONTROL EQUIPMENT

United States Steel Committed to Large Program

THE SUM of $200,000,000 has been spent, or is committed to be spent, by the various industries in Allegheny County, Pa., for apparatus or equipment that will reduce the air pollution in the area.

This figure was disclosed by Thomas C. Wurts, Director of the Allegheny County Bureau of Smoke Control, and Sumner B. Ely, Superintendent of the Bureau of Smoke Prevention of the City of Pittsburgh.

"Industries in the city of Pittsburgh have contributed approximately $95,000,000," said Professor Ely, "and I am very much gratified at the cooperative effort."

The remaining $105,000,000 has been expended by industries in the county outside the city, and the County Smoke Control Bureau states that at least another $100,000,000 will be involved in research and in the purchase of apparatus for the clean-up that is anticipated to come in the highly industrialized areas.

Up to the present time, due primarily to the rapid purchase of Diesel locomotives, the railroads are credited with approximately $168,000,000 of the total. The steel industry, so far, has spent or is spending $21,000,000; central station power plants $6,500,000; and the remainder, approximately $4,500,000, is credited to other industries.

According to Clifford F. Hood, Executive Vice President—Operations, U. S. Steel Company, his firm has carried out an extensive program of smoke abatement since enactment of the Allegheny County smoke control ordinance three years ago.

This program included addition of gas washers to clean blast furnace gas, construction of three sintering plants and a new boiler house, installation of modern stokers to insure proper combustion, and the purchase of Diesel-powered equipment to replace coal-burning plant locomotives and locomotive cranes.

He added that the company's first Diesel-powered tow boat is now in service, and that two similar boats will be added to the company's fleet this year. Four coal-burning tow boats have been equipped to reduce smoke.

Big Job Ahead

The magnitude of industry's smoke abatement program, Mr. Hood said, is recognized in the ordinance which provides for continuation of a research program to 1954, with the possibility of further extension. And these problems are presently made more difficult because of capacity production, which places a constant load on all the company's facilities.

The company, as well as the communities in which its plants are located, benefits from the smoke abatement program. The three new sintering plants not only reduce air pollution but also add to the company's iron ore reserves.

By processing ore dust recovered from blast furnaces, these sintering plants add approximately 1,000,000 tons of ore each year to the tonnage shipped from the Minnesota mines.

HISTORY REPEATS ITSELF

Old Smoke Report Brings Chuckles

A FASCINATING DOCUMENT was unearthed in Cincinnati recently. It was the annual report of John Fehrenbatch, Smoke Inspector, and was dated December 31, 1886—more than 65 years ago.

The exact title is "Report of the Fire-Escape and Smoke Inspector." The first 14 pages are devoted to a report on fire escape installations (378), and recommended installations not completed (968). Only on Page 15 does the author finally begin the material in which members of the Air Pollution and Smoke Prevention Association will be most interested. He says:

"During the year the question of smoke abatement has received all the attention possible for this office to give without neglecting the more important duty of providing for better protection of human life . . .

"Owing to a rapid and large increase

of the dangerous buildings reported to this office, the question of fire escapes necessarily received the attention that the question of smoke abatement would otherwise have received. Nevertheless, a large number of establishments using steam boilers were visited, and many of the owners signified their willingness to comply with the law."

Prices Come Down

The law of supply and demand operated quite well in those days. Mr. Fehrenbatch reports that since June, 1885 the price of fire escapes was reduced about 66 percent and that therefore there is now no excuse for owners of buildings not to install them.

Getting back to smoke violations. A notice to comply was served on 254 firms, of whom 60 indicated their readiness to comply. What about the other 194? The report doesn't say. Reads like it might have been written in certain quarters in 1952!

As of 1886, 34 Cincinnati steam boilers were equipped with smoke-preventing devices. The report continues:

"There are several variously constructed smoke-preventing devices in operation in this city which greatly reduce the volume of smoke that formerly issued from the stacks to which the boilers equipped with these devices are attached, all of which proves that the smoke nuisance can, to a very large degree, be mitigated.

"To do this, however, and to determine with any degree of certainty the kind of device that will prove the most efficient, a complete survey must be made in each case, as there are no two cases where the surrounding conditions are alike."

Amusing Passage

The passage that amused Charles W. Gruber, present Chief Smoke Inspector of Cincinnati, was concerned with the primitive conditions at the Work House, the House of Refuge, the Price Hill and the Hunt Street Pumping Stations, and other municipal property. Mr. Fehrenbatch reported:

"It will be useless to attempt to abate the smoke at the Hunt Street Pumping Station until sufficient boiler capacity is provided to obviate the necessity of unduly crowding the boilers."

In those days many boilers were built without sufficient space between the fire and the tubes. Improper combustion was often the result, and overloading the boiler only aggravated the situation, plus furnishing an extra dense smoke.

Mr. Fehrenbatch had a good sense of public relations. In one paragraph he said:

"The city and county should set the example for all the steam boiler users. When this is done, the labors of the Department will be greatly facilitated, and the work of ridding our people of the smoke nuisance can then go rapidly forward."

ENGLISH ANTI-SMOKE LEADER WAS ADMIRAL

WHEN OVETA CULP HOBBY organized the Wacs during the last world war, the best Uncle Sam could do for her was to make her a full colonel. The British did better by their womenfolk.

Vera Laughton Mathews, one of the most dynamic women on the right little tight little isle, was asked by the Admiralty to organize a women's service attached to the Royal Navy.

Dame Vera

That was in 1939, and her organizing record was so outstanding that she remained a director of the Women's Royal Naval Service (nicknamed the Wrens) throughout the war, and was given the rank of Admiral for her pains. She was at the head of more than 100,000 women employed in more than 100 categories of work. For her achievement in this sphere she was created a Dame of the British Empire by King George VI.

Members of AP&SPAA ought to know more about this vibrant personality, because she recently completed her tour of duty as president of the National Smoke Abatement Society. In appointing her the Society recognized the great part which women ought to play in the question of domestic smoke abatement.

Active in Industry

After Dame Vera retired from the Navy at the end of 1946, she was invited by the Minister of Fuel and Power to become Chairman of the Domestic Coal Consumers' Council which was set up when the coal industry was nationalized. She also joined the Fuel Efficiency Committee of the Ministry.

When the gas industry was nationalized two years later, Dame Vera was appointed a member of one of the 12 area boards, thus becoming the first woman in gas management in Britain. A year later she was invited by the Gas Council to become Advisor on women's affairs for the whole of the gas industry.

As the representative of an industry which produces two smokeless fuels, she is an enthusiastic supporter of the Smoke Abatement movement, and she spoke on the subject in many parts of the country.

Apart from Dame Vera's professional work, she takes a prominent part in women's organizations. She is chairman of the Status of Women Committee and is on the Executive Committee of the Girl Guides. Her husband, a distinguished engineer, died during the war. She has three children—a married daughter and two sons. She loves playing the piano and cruising with her family in their 18-ton motor yacht.

IRON FIREMAN BUYS OIL BURNER FIRM

THE IRON FIREMAN Manufacturing Company, Cleveland, has purchased the Petro oil burner business of the Petroleum Heat & Power Company, Stamford, Conn. The entire line of Petro domestic, commercial, and industrial oil burners and oil heating equipment will be manufactured in the Iron Fireman's Cleveland plant. Headquarters of Petro have been moved to Cleveland to become the Petro Division of the Iron Fireman Manufacturing Company.

NEW COUNTY CONTROL DISTRICT INAUGURATED

Jefferson County, Surrounding Louisville, Ky., To Battle Air Pollution

by JOHN COURTNEY MARKS
Assistant Engineer
Jefferson County Air Pollution Control District

ON JULY 1, 1952, the newly-formed Air Pollution Control District of Jefferson County came into being, and the old Louisville Air Pollution Control Commission was dissolved.

The new department, as did the old, has Ralph W. Bourne as its Chief Engineer. The formation of this new department followed the passage of Senate Bill No. 143, an enabling act allowing counties containing cities of the first and second class within the Commonwealth of Kentucky to form joint city-county air pollution control districts. The bill was patterned after the one enacted for Los Angeles County.

The Jefferson County District will encompass 389 square miles with a population of nearly half a million people.

The industrial activity of the district includes railroads and railroad shops, chemical, fertilizer, distilling, cement, food processing, meat packing, tobacco, brewing, and woodworking plants, and the production of aluminum shapes and foil, farm implements and metal castings.

Credit Shawnee Civic Club

The lawmakers of the state passed the bill without one dissenting vote!

It might well be said that a large part of its successful passage was due to the undying efforts of members of the Shawnee Civic Club of Louisville in their fight to stop air pollution from plants fringing their homes outside the city.

This area southwest of the city, known as Rubber Town, derived its name from plants in the area who manufactured synthetic rubber during the war. It is comprised of a variety of plants whose processes are approximately 80 percent chemical.

It is hoped that through cooperation of the new department with the plants in this area, this section can be freed of a large part of the air pollution stemming from this source. An increasing sense of responsibility to the community has developed among the management of Rubber Town industries, because of insistent demands of the residents since the rapid industrial expansion of this area.

This sense of responsibility has resulted in the setting up of an organization to finance an air pollution study of this area. There is at present a fund in excess of $50,000 for this study, and it is presently planned to conduct it over a two-year period. The survey will be made by Battelle Memorial Institute, noted research group which has made considerable studies of air pollution problems.

Clean Louisville, on the banks of the Ohio River, is going to be cleaner as the new County Control District swings into action.

Industries Cooperate

Eight Rubber Town industries have combined to finance the survey. They are National Carbide, Louisville Gas & Electric, Du Pont, B. F. Goodrich Chemical, Reynolds Metals, Kentucky Synthetic Rubber, Louisville Refining, and Carbide & Carbon Chemicals Corp.

A spokesman for the industries said "the results of the survey will be made public even if the finger points to one or more of the Rubber Town industries."

About 20 test stations have been set up. Battelle researchers will also make weather studies, develop apparatus needed for the survey, and make complicated micro-chemical analyses to determine the irritants and pollutants in the air.

Other Sections Studied

There are also other sections of Jefferson County with similar problems and a need for atmospheric cleansing. One in particular is the Shively area which bounds Louisville on the south, and is comprised of a large number of distilleries.

We have received numerous complaints on these plants for emission of fly ash from people living in the area. Fly ash collectors and other relative equipment can abate a large part of this nuisance. There are quite a number of woodworking plants in the district who use wood shavings and sawdust for fuel, and half-burnt shavings are a major pollution problem in some areas. Constructive measures are being discussed with the management of these plants and we feel that the use of collecting systems will be the ultimate answer.

The staff of the Jefferson County Air Pollution Control District. Seated, left to right: Donna L. Forol, secretary; S. E. Daniels, inspector; Martha Burkhead, clerk; and Vic Reynolds, assistant engineer. Back row: H. W. Woodson, inspector; Lonnie Estes, inspector; J. C. Marks, assistant engineer; Ralph W. Bourne, Chief Engineer; Clyde Hawkins, inspector.

Mobile Unit Wanted

The budget of the new department allows for a staff of nine men and two stenographers. One major item, long needed by the department and provided for in the new budget, is a mobile laboratory unit. The unit will be equipped with stack sampling and general atmospheric sampling devices, and some meteorological recording equipment.

It is to be patterned after the one used by the State of Pennsylvania Department of Air Pollution Control (see Page 23). There are to be two men permanently assigned to the unit who will operate it on a trouble shooting basis in areas in need of sampling and correction.

We are fortunate in having in Louisville sources of technical advice such as the University of Louisville Institute of Industrial Research, the State Department of Industrial Hygiene, the American Air Filter Company, and the U. S. Weather Bureau. All these agencies have offered assistance when and where it is needed.

Engineering Service

In addition we feel sure that we will continue to have the aid of the N.A.P.E. Special Smoke Committee and the Louisville Coal Institute's engineering service plan to combat smoke problems. The N.A.P.E. Smoke Committee has certainly done an excellent job in the past in offering sound engineering advice to fuel-burning plants on increasing efficiency and smokeless operation.

The plan, inaugurated last January, of notifying the Louisville Coal Institute of violators so that they could dispatch a combustion engineer to troubled plants that use coal, has served to abate smoke problems that otherwise might have required a much longer period of time and considerably more manpower in the department.

News Agencies Helped

Our seven years' experience as a city department taught us much in the ways of combating air pollution and we have found that good public relations, along with sound engineering, is the key to a working program. The newspapers, radio and television stations have given us excellent cooperation in the publicizing of our program.

In addition to the broad news coverage of our activities through the above mediums we also publish our own paper, *Air Pollution Control Activities*, each month, which includes the general activities of the department and the monthly report. Our circulation for the paper is now 300 copies, and it is mailed to civic clubs, technical groups, and plant management.

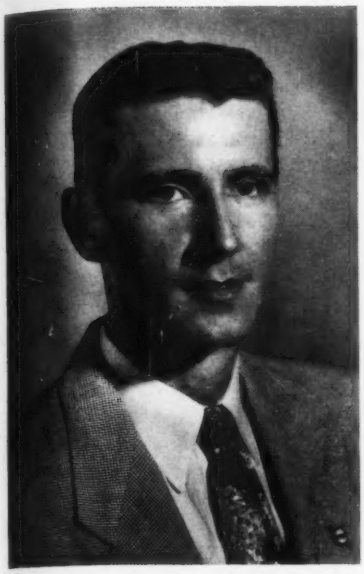
We have found that training sessions for operation personnel of the plants under our jurisdiction has helped these men in better ways to use their equipment with a minimum of trouble and air pollution. This past spring Vic Reynolds, assistant engineer, who had charge of the training sessions, set up the lectures over a period of three months, and they were primarily aimed at the proper use of combustion equipment. He is currently setting up his fall program and expanding his coverage over a wider range of equipment. We feel that incorporating this in our program will help in reducing air pollution.

Training Sessions Successful

We also found that having weekly training sessions for our staff has added to our efficiency. These training sessions are usually held each Friday, and the men rotate in discussing new ideas on air pollution control which help us in our work.

Our job of policing the county and its air pollution troubles will indeed take time. But the engineering principles used, the method of educating and selling the worth of the program to the people, and the efficiency of these two will determine how much time.

Ralph W. Bourne and Vic Reynolds talk over one of the new problems to be encountered. This area of Louisville, known as Rubber Town, is primarily made up of chemical process plants.



John Courtney Marks, energetic assistant engineer of the Louisville Air Pollution Control District, is a native of Harrisburg, Pa., who entered the army in 1942 and served with the 16th Armored Division.

In August, 1943, he received a disability discharge and moved to California where, in the capacity of electrical layout man, he worked for the California Ship Building Corporation at Terminal Island.

In October, 1944, he moved to Louisville and worked for the Louisville & Nashville Railroad as a locomotive fireman. He was promoted to locomotive engineer — one of the youngest in the country at that time. He joined the Louisville Smoke Commission as a smoke inspector in 1950, promoted to assistant combustion engineer in October, 1951, and more recently to assistant air pollution control engineer. He belongs to a number of technical societies, is married, and has three children.

A MAN OF LETTERS

NOW THAT we're about to change our name, we recommend something of the same to that new police official in the Fiji Islands.

Acting Assistant Superintendent Levani V. Tamanikairukurukuiovalau ought to do something about his name, just as we did.

Two years ago, the New York *Times* reported, when this bull was studying police methods in New Zealand, he unintentionally started a quest for long Polynesian names all over the English-speaking world.

Punch printed an item about him, closing with the comment, "Obviously a man of letters!"

Discussing a sample of fly ash dust taken from a home located near a large plant. It will be compared later with the samples taken at the plant. Left to right: Ralph Bourne, H. W. Woodson, the inspector who took the sample, and Vic Reynolds.

RADIOACTIVE TRACERS USED IN AIR POLLUTION STUDIES

Atomic Energy Commission to Send Expert to Louisville To Speak Before September Meeting Of East Central Section

EDWARD G. STRUXNESS, of the Health Physics Division of the Atomic Energy Commission, Oak Ridge, Tenn., will speak on *Use of Radioactive Tracers in Air Pollution Study* on the first day of the September meeting of the East Central Section at Louisville, Ky.

The meeting will be held on Sept. 18 and 19 in the Kentucky Hotel, and reservations are being taken by J. Courtney Marks, Assistant Engineer, Jefferson County Air Pollution Control District, 310 City Hall, Louisville.

The two-day meeting will begin with a welcome by Mayor Charles Farnsley, followed by a paper on *Meteorological Aspects of Air Pollution Control,* by O. K. Anderson, U. S. Weather Bureau, Louisville. John M. Kane, of the American Air Filter Company, Louisville, will speak on *Dust and its Control.*

James H. Carter, President of AP & SPAA, will be the luncheon speaker.

The Struxness paper will be given directly after luncheon, followed by a paper entitled *Past and Future Plans of the Fuel Industry in the Control of Air Pollution,* by H. B. Lammers, chairman, Coal Producers Committee for Smoke Abatement.

W. W. Stalker, Director of the Department of Industrial Hygiene, State of Kentucky, will speak on *Inplant Pollution Effects on Outplant Pollution.* Harry Lane, secretary of Chapter No. 1, National Association of Power Engineers, Louisville, will speak on N.A.P.E.'s approach to the abatement of smoke in Louisville.

Mr. Lane's paper ends the first day's session. A cocktail hour has been planned, followed by dinner and a conference (closed session) of air pollution control officials.

On the second day the committee plans to have a paper on boilers and combustion, with speaker and title to be announced later. J. S. Sharrah, Director of

the Air Pollution Control Division of the Dept. of Health of the State of Pennsylvania (see Page 23), will speak on *Experiences of an Air Pollution Division Operating at a State Level.*

J. L. Eschrich, a reporter for the Courier-Journal, will then speak on *Air Pollution Problems of Louisville, Past and Present,* followed by Prof. M. Carlson, of the University of Louisville, who will describe the 1950 dust survey of western Louisville.

Luncheon speaker will be Robert T. Griebling, Executive Secretary of the Air Pollution & Smoke Prevention Association of America, who will discuss *Progress in Air Purification.*

The afternoon will be taken up with two addresses, followed by plant tours. The first speaker slated is Edwin L. Alpaugh, Assistant Engineer, Bureau of Smoke Inspection, Cincinnati, who will discuss *Techniques Used in Sampling Particulate Matter in Cincinnati.*

Trends of railroad motive power and their effect on air pollution will be discussed by members of the mechanical engineering department of the Louisville & Nashville Railroad.

NEW TOWBOAT LAUNCHED

THE R. L. IRELAND, a 108-ft. Diesel towboat constructed by the Dravo Corporation for the Pittsburgh Consolidation Coal Company, was named in honor of the chairman of the company's executive committee.

It will be used to push barges from the company's mines to river-rail terminals and customers' plants. All modern equipment for efficient river navigation is installed on the *Ireland,* including pilot house control of the main engines, radar, air-operated reversing gears, and ship-to-shore telephone.

BALTIMORE NEXT!

As we go to press, we want to report a long distance telephone call from Milton Reizenstein. He has *just about* completed arrangements, and will let us know the date of the 1953 Annual Meeting in a matter of days. We'll alert the membership as soon as possible.

SURVEY OF PENNSYLVANIA LAWS PERTAINING TO AIR POLLUTION

This air pollution summary is the work of John A. Deasy, Research Fellow, and David Stahl, Assistant Professor of Legal Research, both of the University of Pittsburgh. Mr. Deasy, a 1948 graduate of Duquesne University, conducted the initial research and did the basic writing for the Forestry Section of the Conservation Law Project of Pitt last year. He has been a member of the Public Health Law project since February. Mr. Stahl obtained his LL.B. from Pitt in 1949. He is a member of the Allegheny County Bar, a co-editor of the Public Health Laws of Pittsburgh, board of the University of Pittsburgh Law Review.

IT IS the purpose of the survey to discuss the laws in Pennsylvania which deal with the regulation of air pollution and the administrative agencies that enforce these laws. More emphasis is placed on local air pollution legislation and administration than on State administration because the administration of air pollution programs, apart from industrial pollution, is predominantly local.

Administration

Three administrative agencies at the state level deal with the pollution of air in Pennsylvania. These are the Department of Labor and Industry, the Department of Mines, and the Department of Health.

A primary function of the Department of Labor and Industry is the promulgation of rules and regulations concerning atmospheric contaminants. Generally, this rule-making function has been delegated to the Bureau of Industrial Standards.

Further activities of this Bureau are investigations into industrial uses, health and sanitation, and the inspection and analysis of air samples for poisonous dusts and other atmospheric contaminants. At the present some 60 regulations have been promulgated, many of which aim at the control of air contaminants to safeguard the employee's health.

The Administrative Code empowers the Department of Health to have examinations made "of nuisances or questions affecting the security of life and health" in any community. For this purpose apartments, buildings and other places within the State may be entered and examined. Nuisances detrimental to the public health, or the causes of disease and mortality, may be abated and removed.

The Bureau of Industrial Hygiene is the administrative arm of the Department in the control of industrial atmospheric pollution. The engineering services of the Bureau include, among others, the detection and quantitive determination of industrial atmospheric contaminants such as dust, gases, volatile solvents, and toxic metals, as well as its recommendations on the problems of exhaust and general ventilation, plant sanitation and the control or elimination of health hazards.

One result of the smog disaster in Donora was the creation of a Division of Air Pollution Control within the Bureau of Industrial Hygiene to study these potentially dangerous emissions.

This Division is specifically concerned with the presence in the air of chemical gases, fumes, and other toxic materials that may be caused by industrial operations. It concerns itself with smoke control only where the smoke may contain toxic materials.

Investigations of conditions in given localities are instituted by the Division when believed necessary or at the request of the citizens of a polluted area. From its experience, the Division is working towards the establishment of standards of toxicity for air pollutants. The work is carried forward by a collection of samples of air at various investigation points with an analysis of these samples made to determine the kinds and amounts of contaminants contained therein.

One regulation of the Department of Health affecting nuisance control states that any person maintaining a slaughterhouse, rendering plant, repository of dead animals, glue works, tannery, wool washing establishment, paper mill, by-product coke oven, dye works, ore refinery, dairy, creamery, cheese factory, milk station or similar establishment, or engaging in the manufacture of gas, chemicals, explosives, fertilizers or similar products, or in the business of soap making, fish oil extraction, bone boiling or similar occupation, shall not allow any noxious gases that are deleterious or detrimental to public health to escape into the air.

Department of Mines

The Administrative Code requires the Department of Mines to see that the mining laws of the State are executed, to make examinations and investigations, and through a separate bureau to take any needed steps for the promotion of mining and mineral interests. Since certain of the mining laws now in force require the control of atmospheric pollution caused by mining operations, the Department, by virtue of the Code, is the enforcement agency.

INDUSTRIES—The Act of May 18, 1937, contains an extensive coverage of health and safety requirements for industry. A subsection of the act specifically deals with pollution of air caused by various manufacturing processes.

Provision is there made that "all toxic and noxious dusts, fumes, vapors, gases, fibers, fogs, mists or other atmospheric impurities, created in connection with any manufacturing process, emitted into or disseminated throughout areas where persons are employed in such quantities as would injure the health of the employee or create other dangerous conditions, shall be removed at the point of origin, or, where this is impractical, personal protective devices shall be provided and worn by persons subjected to such hazards."

The penalty section imposes upon a first offender a fine of from $25 to $100 or, in default of payment, an imprisonment of 30 days.

ANTHRACITE MINES—The Act of June 2, 1891, imposes duties on the owners, operators, or superintendents of anthracite coal mines to control the pollution of air in the mines for the health and safety of miners. A regulation contained in the act requires the adoption of measures for the removal of dust, as far as practicable, from all coal breakers where the density of coal dust is likely to prove injurious to the miner's health.

Another regulation found in the act requires the mine foreman or his assistant to examine each morning all the places in the mine which could endanger the miner's safety. If the examination discloses the presence of noxious gases or any other condition rendering the mine unsafe the workmen must be withdrawn until the danger is abated.

BITUMINOUS MINES — The Act of June 9, 1911, governing the operation of bituminous coal mines contains provisions similar to the Act of 1891.

A regulation contained in the act expressly forbids anyone to commit any nuisances or, throw into, or leave coal or dirt, stoves or other rubbish, in the airway or road, so as to pollute the air passing into and through the mine.

WINS $1153—Paul Grimes, information assistant of the Los Angeles County Air Pollution Control District, split $2306 with Helen Hummel, of Hollywood, for properly naming four historical figures and for identifying the Charge of the Light Brigade with the Battle of Balaklava in 1854 on the Groucho Marx radio and TV show. Grimes also defined "smog" for Groucho, but insisted, as far as Los Angeles was concerned, it should be "smaze," a combination of smoke and haze.

MUNICIPAL AIR POLLUTION REGULATION

Pollution of the air is generally a localized problem, unique to the particular locality and economy of a given community, with few, if any, communities having exactly the same control problems.

It is not surprising, therefore, to find, that apart from the industrial air pollution legislation administered by State agencies, air pollution regulation has been left to the local authorities. The legislation which has permitted municipalities to administer air pollution control programs is summarized below.

I. LEGAL AUTHORITY OF MUNICIPALITIES TO REGULATE AIR POLLUTION

Smoke Legislation

The first statute dealing with the smoke problem in the Commonwealth was the Act of June 6, 1911. This act authorized cities of the second class (Pittsburgh) to regulate by ordinance the production or emission of smoke from any chimney, smokestack or other source.

The need for enabling legislation of this sort had become reasonably apparent after two Pennsylvania court decisions held two smoke ordinances of the City of Pittsburgh invalid as an unreasonable exercise of the City's police power.

Since cities of the second class A are generally governed by the laws applicable to cities of the second class the smoke law of 1911 would also apply to cities of the second class A (Scranton).

Two other acts pertaining to second class cities and indirectly affecting smoke control are worthy of mention. Section 3 of the Second Class City Law of 1901 permits regulation of the construction and inspection of fire places, chimneys, ovens and boilers which may be used in any building or manufacturing business. Section 1 of the Act of May 13, 1915 permits second class cities to establish regulations and specifications for the con-

struction of chimneys, stacks, flues, smokepipes and ventilators.

Similar authority to control smoke was vested in third class cities by the Third Class City Law of 1931 (the same section of the law permits a regulation and inspection of fireplaces, chimneys, stoves and boilers and the Third Class City Law of 1951 contains provision for the regulation of fly ash); in first class townships by the First Class Township Code of 1931; and in boroughs by the Borough Code of 1927.

The most recent smoke enabling legislation pertains to smoke control in second class counties. (Allegheny is the only second class county.) This is the Act of May 28, 1943 conferring power on the county board of commissioners to regulate the emission of smoke.

Broader in its terms than the preceding legislative authority to municipalities, the 1943 act provides for the examination of plans, issuing of permits, inspection of fuel burning devices and the payment of inspection fees. The board may appropriate money, hire employees and purchase necessary property and equipment.

Any person found guilty of violating any ordinance passed by virtue of the act is subject to fine or imprisonment.

Railroad Laws

It is interesting to note that the smoke laws applicable to third class cities, boroughs and first class townships, considered above, contain exemptions for railroad locomotives. Such exemptions do not appear to violate constitutional requirements, however, since legislature in passing a statute may use any reasonable classification having some rational basis in public policy even though certain activities may be excluded.

The Philadelphia, Pittsburgh and Allegheny County ordinances regulate not only locomotives but also steamboats operating on navigable waters as well.

Thus, only cities of the first class (Philadelphia), second class townships, and counties other than counties of the second class, lack enabling legislation permitting a regulation of the production and emission of smoke. However, as early as 1904, the City of Philadelphia enacted an ordinance regulating the emission of smoke from chimneys, stacks, flues or open spaces. The present air pollution ordinance of Philadelphia was promulgated under the authority conferred by the First Class City Law of 1929 granting general power to make ordinances for the proper management, care, and control of the city and conferring general police powers.

Our research has not disclosed any ordinance of a second class township regulating the pollution of air. Such an ordinance would presumably be enacted under the authority granted by the Second Class Township Code of 1947 which allows second class townships to prohibit and remove nuisances on private and public property, and to prohibit the operation of any offensive manufacture or business, and permits the enactment of ordinances for the promotion of the health, cleanliness, comfort and safety, of the citizens of the townships.

Health, Nuisance and General Welfare Legislation

In addition to the enabling laws which authorize certain municipalities to regulate smoke, there exists statutory authority for municipalities to provide for the health and comfort of the inhabitants.

This authority, found in the health, nuisance and general welfare provisions common to all the municipal codes, has already been mentioned as a basis for the present air pollution regulation by the City of Philadelphia and as a possible basis for similar activity by second class townships, neither of which have the benefit of smoke control enabling legislation at this time.

While such laws do not purport to regulate air, it would appear that they are sufficiently broad to countenance, by implication, a regulation of air pollution detrimental to public health. They have been so used and upheld by the courts in states presently lacking enabling authority.

Although a lower court decision of 1911, in holding invalid the City of Pittsburgh smoke ordinance, cast doubt upon the ability of the City to regulate smoke under the health and general welfare provisions of its charter, the court actually based its decision on the unreasonableness of the ordinance, and the decision is in no way authority for the proposition that air pollution regulation can be legally attained only by enabling legislation.

Furthermore, and perhaps what is more important, these laws could be used to support the legal authority of a municipality having smoke enabling legislation to regulate air pollutants other than smoke.

For example, the ordinances of the City of Pittsburgh and the cities of Easton and Erie (third class cities) have under their respective smoke control laws regulated such additional contaminants as fumes, soot and fly ash.

Since municipal units can act only within the scope of their delegated authority, the regulation of these contaminants may cast some doubt upon the validity of such ordinances inasmuch as the authority specifically delegated, i.e., the right to control smoke, appears to have been exceeded.

By considering the ordinances in the light not only of the smoke authority but the broad powers over health and nuisances that have been given to the municipality, these ordinances could be upheld by the courts should the question ever arise. A lower court decision of 1949, upholding the constitutionality of the Pittsburgh ordinance, did not raise the point.

Since, as a practical matter, little use has been made of these general laws now being considered for the regulation of air pollution, no useful purpose would be served by summarizing them in detail.

It will suffice to mention their existence and to state that they permit the enactment of regulations for the health of the citizens, the prevention and removal of nuisances and the proper management and control of the community.

The Second Class City Law of 1901 further allows second class cities to prescribe limits within which no dangerous, obnoxious or offensive business shall be conducted, and the Borough Code permits a borough to prohibit and remove not only nuisances but any noxious or offensive business.

Power is also conferred on the local boards or departments of health of the various municipalities to abate and remove nuisances detrimental to the public health, with the cost of abatement to be borne by the owner or any other person creating the nuisance.

II. MANNER IN WHICH CERTAIN MUNICIPALITIES HAVE EXERCISED THIS LEGAL AUTHORITY

A summary of all the local air pollution ordinances is beyond the scope of this Survey. However, the principal features of a few will be considered, namely, the air pollution ordinance of the City of Philadelphia, and the smoke ordinances of Pittsburgh and Allegheny County.

While the Pittsburgh ordinance is probably the best known, the others are good examples of air pollution regulation. Allegheny County is the only county in the Commonwealth that has an air pollution ordinance of any type.

Philadelphia's ordinance assumes prominence not only because the size of the city makes pollution control imperative, but also because it deals generally with the air pollution problem, whereas the Pittsburgh ordinance is directed primarily to smoke, although it incidentally regulates other contaminants as well.

Administration

The air pollution ordinance of the city of Philadelphia vests administrative authority in the Division of Air Pollution Control in the Bureau of Health, Department of Public Health. The Division is headed by a Chief who must be an engineer. There is also established an Air Pollution Control Board, consisting of seven members, which functions both as an appeal board and in a supervisory and advisory capacity to the Division. This provision allowing the Board to act in a *supervisory* as well as advisory capacity could conceivably cause difficulty since it would appear possible for the Board to enter into the daily operations of the Division, with a resultant division of control between the Board and the Division.

The City of Pittsburgh smoke ordinance creates a Bureau of Smoke Prevention as a separate unit in the Pittsburgh Department of Public Health. The Bureau is headed by a Superintendent of Smoke Prevention, a professional engineer, who is administratively responsible to the Director of Public Health. Although provision is made for an appeal board of five members, such a board has never been established.

The smoke control ordinance of Allegheny County is administered by the Bureau of Smoke Control, headed by a Director who is also a professional engineer. By resolution of the Board of County Commissioners, a Smoke Control Advisory Committee of not less than nine members was established for the purpose of advising the Director and recommending to the Commissioners any amendments to the ordinance deemed advisable.

Ben Linsky, Chief Smoke Inspector, City of Detroit, Mich., with Fran Harris, Woman's Editor of WWJ-TV. The television station has been running a series of 15-minute programs specially prepared to tell the citizens about the activities of their various city departments. The Detroit Smoke Abatement Bureau was given two programs recently.

Prohibitions

The Philadelphia ordinance prohibits the discharge into the open air of smoke of a shade in excess of No. 2 of the Ringelmann Chart with specified exceptions, or of dust in gases exceeding 0.85 lbs. per 1000 lbs. of gases, adjusted to 12% CO_2 content, and prohibits the burning of garbage, refuse, rubbish or other material in an open fire except under regulated conditions, and the discharge into the open air of noxious fumes or gases of a character and quantity detrimental to the public health.

Since the major domestic fuels used in the City are oil and anthracite coal, which do not contribute to the smoke problem to any appreciable extent, it was not deemed necessary to regulate dwellings of less than three dwelling units.

Under the Pittsburgh ordinance smoke of a density equal to or in excess of No. 2 of the Ringelmann Chart is prohibited with certain exemptions. The escape of soot, cinders, noxious acids, fumes or gases which cause injury, detriment or nuisance or endanger the health or safety of any person or the public is forbidden. The emission of fly ash is regulated.

The ordinance of Allegheny County contains prohibitions against injurious smoke and fly ash. Smoke in excess of No. 2 of the Ringelmann Chart is not permitted. Generally, fly ash in gases may not exceed 0.85 lbs. per 1000 lbs. of gases adjusted to 50% excess air in the products of combustion.

Special provisions are contained in each ordinance for railroads. These provisions generally permit the emission of smoke in excess of No. 2 of the Ringelmann Chart for a stated period of time during which a locomotive fire is being built or a firebox being cleaned.

The Allegheny County ordinance requires each railroad operating within the County limits to report twice yearly as to the number of locomotives used in the County. The requirements for boats and tugs which are also found in each ordinance generally contain the same exemptions that are established for railroads.

Fuel Supply Regulation

The City of Pittsburgh regulates the type of fuel which may be offered for sale in the City by making it unlawful to sell or offer for sale any solid fuel for hand-firing or surface-burning types of equipment which does not meet the standard of a smokeless solid fuel.

A smokeless solid fuel is defined in the ordinance as one, the volatile content of which is 20% or less on a dry basis, or one which, though failing to meet this standard, nevertheless meets the same standards in regard to smoke production as do fuels containing less than 20% volatile matter. Solid fuel with a volatile content in excess of 20% on a dry basis can be used or consumed only in approved mechanical fuel-burning equipment.

The restriction on the sale of high-volatile coal to consumers using mechanical fuel-burning equipment is also implemented by the solid fuel dealers' ordinance of 1946. It should be noted that the County Court of Allegheny County in *Commonwealth v. Pollard,* 97 P.L.J. 133 (Co. Ct. Allegheny Co. 1948), concluded that the section regulating the sale of fuel in the Pittsburgh ordinance was a valid exercise by the City of its power over the smoke nuisance.

The Allegheny County ordinance contains provisions for the licensing of coal trucks for the purpose of checking and controlling the delivery of proper solid fuels in the County.

Penalties

Penalty provisions take the form of fine, imprisonment, sealing of equipment failing to comply with the law or other prohibitions on use. Fines range in amount from $10 to $100. In default of payment the offender faces imprisonment.

For a violation of the Philadelphia provisions the Chief of the Division of Air Pollution Control may prohibit the use of the equipment. In Pittsburgh and Allegheny County authority is given to seal the equipment when three or more violations have occurred. The deterrent effect of sealing is much greater, of course, than the threat or imposition of a fine.

No liability is imposed on the offender to compensate a person who may be injured by the violation. Any damages recovered by an injured third party would have to be on theories of general tort liability.

III. MISCELLANEOUS LEGISLATION

Zoning

Seven enabling statutes in the Commonwealth broadly permit cities, counties, boroughs and townships to adapt zoning ordinances designed to promote the public health and general welfare of the community.

These statutes do not specifically refer to air pollution regulation. However, a first class township (Plymouth) presently regulates atmospheric emissions under a zoning ordinance directed at the erection or use of any building, lot or premises for any trade, industry, or business which because of odor, smoke, dust, gas, vibration or noise, is noxious or offensive.

The constitutionality of this ordinance was upheld in a lower court decision of 1949.

The use of a zoning ordinance in this manner and for this purpose may have some significance, indicating as it does a possible additional method that may be employed for the control of air pollution.

It should also be noted that several state legislatures, in drafting their respective rural-zoning enabling laws, have inserted directives to the municipalities that their respective ordinances should seek to prevent the escape of obnoxious fumes or offensive odors, and protect residential sections from traffic, noise, smoke, fumes and other unwholesome conditions and influences.

Municipal Refuse Disposal

One aspect of air pollution more closely related to public health than some of the other problems of air pollution is the problem of municipal refuse disposal.

Although there are laws which, in authorizing municipalities to provide for the collection, removal and disposal of garbage, ashes and other waste material, control the pollution of air indirectly, the only act containing specific regulatory provisions for air pollution is the Act of May 25, 1933 pertaining to second class counties (Allegheny).

This provision is found in Section 10 of the act which forbids the escape into the air from any disposal unit of noxious odors or gases that are deleterious to the public health or are vile or offensive.

Burning Gob Piles

Another difficult problem encountered in the regulation of air pollution is that caused by burning gob piles, the fumes from which contain many compounds, particularly sulfur oxides, irritating to the nose, eyes, and throat. Appropriation Act No. 81-A, approved May 26, 1949, authorized an appropriation by the State of $15,000 to the trustees of Pennsylvania State College for research and investigation of these refuse piles in the hope that they might be eliminated. In order that the sum of $15,000 be expended the bill requires that the bituminous coal industry make available to the college a like amount of money for the research.

Criminal

Smoke, of itself, was not a nuisance at common law. It was considered a nuisance, however, when it was shown that the smoke had developed in sufficient quantities to cause hurt, damage or annoyance to the public or to an individual. Consequently, Section 612 of the Penal Code, which makes it a misdemeanor to establish and maintain a public nuisance, is sufficiently broad to impose criminal liability on any person, who, in polluting the air, creates a public nuisance.

IV. PROPOSED LEGISLATION

An attempt by the Pennsylvania legislature to give enabling authority to municipalities for a regulation of air contaminants other than smoke, and its recognition of the pollution of air as a serious nuisance, is comparatively recent. The proposal of new reforms on this subject are indicative of a growing awareness of the problem. Even though in a majority of cases the bills introduced died in committee, it may be well to devote some brief attention to them.

An important event in the air pollution field occurred during the 1949 session of the legislature. This took the form of a resolution adapted by the State Sen-

ate, directing the Joint State Government Commission "to make a thorough and exhaustive study of the smoke and soot nuisance problem existing in the Commonwealth to the detriment of the health of its citizens and the depreciation in value of the property . . . and prepare model smoke control plans suitable for use by the various political sub-divisions of the Commonwealth.

H.B. 66

Two bills concerning atmospheric pollution were introduced in the 1951 session. One bill, House Bill No. 66, conformed closely to the Second Class County Act of 1943, though it would have extended control to various air pollutants.

The bill would have given the county commissioners of fourth class counties the authority to regulate smoke, with a regulation of other contaminants permitted, upon an affirmative finding by a commission, appointed by the county commissioners, that such regulation was necessary. House Bill 66 was referred to the Committee on Counties.

S.B. 743

The other proposal was Senate Bill No. 743, the most comprehensive piece of air pollution legislation yet proposed for the State. The bill resembled in its salient features the present California air pollution act which permits county officials to establish air pollution districts following county lines and authorizes control in terms of a definition of air pollution and a broad coverage of sources to be regulated, with exemptions made in terms of designated rates of discharge of the contaminants regulated.

S.B. 743 would have been known as the "Smoke Control Law" and would have provided for the creation of County Smoke Control Districts upon a proper determination regarding their feasibility by the county commissioners, i.e., it would have been a permissive law.

Some question might arise, however, as to the necessity or desirability of creating a Smoke Control District in any county where a County Department of Health may be established by virtue of the Local Health Administration Law of 1951.

The health unit in such a county could be the administrative agency ultimately to carry out smoke control. Since the Local Health Administration Law is also permissive, the use of a county department of health to regulate air pollution would only arise in counties which establish such departments.

There is the further question as to whether air pollution regulation is sufficiently related to public health that it should be administered by health authorities,, or whether air pollution control would be better administered by a separate bureau independent of the county health department. Although air pollution may not be a serious or critical menace to public health, it is generally agreed that it does affect the public health, and the question of who can more effectively administer an air pollution control program must be given careful consideration in the drafting of any new legislation.

As an additional feature of the proposed law there would have been superimposed upon the "Control Districts" a State Smoke Control Commission as a departmental administrative commission in the State Department of Health.

The main functions of this commission would have been to conduct research into smoke control problems, disseminate information pertinent to smoke control, require reports from the county smoke control districts, and issue rules and regulations supplementing the statute.

Specific provisions regulating smoke, particulate matter and sulfur compounds, were set forth in the bill. These regulations as to emissions, however, would not have been conclusive since the County Smoke Control Board (a Board composed of the county commissioners in the County Smoke Control District) would have been authorized to promulgate additional regulations to those contained in the proposed law.

Additional authorization was also contained for the appointment by the State Smoke Control Commission of a County Smoke Control Officer who would have been the enforcement officer for each county district, and for the Hearing Board, appointed by the County Smoke Control Board, which would have had authority to continue or remove the suspension of permits and to grant variances from the standards prescribed in the law.

STOKER MANUFACTURERS ELECT

THE 35TH ANNUAL MEETING of the Stoker Manufacturers Association, held near Syracuse, Indiana, was attended by 70 representatives of prominent stoker manufacturers, allied supply firms, and representatives of allied industries.

L. C. Dubs, of the Canton Stoker Corporation, was elected president for the ensuing year. Other officers included B. O. Fink, president, Auburn Foundry, Auburn, Ind., vice president, and Howard B. Scoville, Cotta Transmission Company, Rockford, Ill., secretary-treasurer. Marc G. Bluth, Chicago, was re-appointed executive secretary.

The following directors were elected: besides Messrs. Fink, Dubs, and Scoville, Leslie M. Friday, president, Carpenter Heating & Stoker Company, Cleveland, O.; George W. Graham, president, Eddy Stoker Corporation, Chicago; Charles D. Burrier, manager of stoker sales, Frederick Iron and Steel, Inc., Frederick, Md.; Frank Hoke, president, Holcomb & Hoke, Indianapolis, Ind.; J. M. McClintock, manager, heating division, Illinois Iron and Bolt Company, Chicago; C. T. Burg, vice president in charge of sales, Iron Fireman Manufacturing Co., Cleveland, O.; C. P. Meredith, executive vice president, Steel Products Engineering Company, Springfield, O.; Claude A. Potts, vice president, U. S. Machine Corporation, Lebanon, Ind.; E. G. Baer, vice president, Will-Burt Company, Orrville, O.; and E. J. Worley, president, Worley Equipment, Inc., Chicago.

JAKE DAUBERT AMAZED

"DID YOU KNOW" telephoned C. W. Daubert excitedly, "that out of the 486 men who attended the Cleveland convention, 316 were individual members or representatives of company and sustaining members?"

Even the Secretariat didn't know that. Jake, who had to stay home because his doctor ordered him to, had evidently been studying the statistics.

"Only 170 of those who attended were non-members," he continued. "This means that 65 percent of the membership was in Cleveland. Can any other Association match that?"

Jake, we don't know, but we don't think so. What an outfit!

Chaos Versus Planning in Industrial Air Pollution

by FREDERICK G. SAWYER and WILLIAM E. RAND
Stanford Research Institute
Stanford, California

Pollution expert—a new calling and an important one, is a necessary entry in tomorrow's industrial job classification. Dr. Sawyer and Mr. Rand herewith present—in most entertaining fashion, the developments that led to the new position, with a description of the expert's duties.

POLLUTED AIR can be planned out of existence if we use all the tools available. These include research, money, cooperation, and a sincere desire desire to clean up the air.

The idea of a coordinated effort to control air pollution is fairly new. Control by chaos has been the tradition since the beginning of the industrial revolution.

The coal-driven economy moved so swiftly both in Europe and in this country that the urban citizenry accepted the turning of their atmospheres into sewers almost as a measure of industrial progress. Occasional lone irate voices of protest were heard railing against the contaminated conditions of city air.

Much progress has been made by industrial hygienists in providing clean air for workers in factories and mines. Much less attention has been given to the air breathed by the worker or by his family in his home.

The picture is changing in this country. Several cities have made progress: Pittsburgh, St. Louis, Cincinnati, and Los Angeles, among others.

Research at Los Angeles

Let us consider Los Angeles for a moment. All the tools needed for solving the smog problems are at hand. Research is being done by the Los Angeles County Air Pollution Control District, California Institute of Technology, University of California at Los Angeles, University of Southern California, and Stanford Research Institute.

During the past five years, the money spent for research approximates $1,500,000, more than two-thirds of which has been given by the Western Oil and Gas Association to sponsor work at Stanford Research Institute designed to find the nature and sources of smog.

The cooperation between the Air Pollution Control District and industry has been notable. Since activation of the District in 1947, more than $17,500,000 has been spent by industry in the County for control equipment to abate or eliminate emissions to the atmosphere and to meet regulations set up by the District. This is evidence of a sincere desire to clean up the air.

More money needs to be spent to study other sources of pollution. Regulations will have to be devised or changed to keep pace with the growing knowledge of pollution control. Some attempt is being made to match the regulations with the best known performance of recovery equipment.

In some cases the regulatory group is working with equipment manufacturers to see if recovery units can be improved or changed to meet the County requirements.

Pollution and the Public

Polluted air is bad advertising, whether for a city, a factory, or a home fireplace. It may signify an indifferent public, poor management, or a bad fireman. In any case, air pollution problems will not solve themselves. Intelligent planning is needed to make progress against dirty, odorous, and possibly dangerous air.

In recent years we have heard much about a planned economy. Perhaps we should apply these words to combating air pollution in more American cities. The economy of a community should be planned to include the cost of proper waste disposal methods. The economy of an industry should be planned to include the cost of air pollution abatement equipment.

Although the majority of recovery installations do not pay their own way, they more than make up for this by promoting good relations with the public. There is no case on record where a smoking stack or odorous dump made friends.

Air pollution is largely a problem of public relations, good housekeeping, and economics. Solving the problem requires the coordinated talents of the inquiring scientist, the crusading legislator, and the ingenious engineer.

Industry Blamed

Although the sources of man-made pollutants are practically limitless, the average citizen blames industry for most of the atmospheric pollution. He remembers smoking stacks and strange smells. He thinks of the industrial section in any large city. The public sometimes demands closure of industrial plants, or elimination of industry.

Dr. Frederick G. Sawyer is Assistant to the Director of Research at Stanford Research Institute. He formerly directed the Institute's air and water research program. He holds three degrees in chemical engineering, including a Ph.D., which he obtained from Brooklyn Polytechnic Institute. Before coming with Stanford, Dr. Sawyer served in industry, in the War Department, and for a time headed the American Chemical Society's editorial offices in San Francisco, which was a newsgathering agency for the west. He is affiliated with a number of technical societies.

Although these may be unrealistic solutions, industry cannot ignore popular pressure. The demand for clean and clear air continues to grow. Accompanying this will be stricter regulations. Strict interpretation by courts might force some firms out of business.

True, industry is partly responsible for polluted air. That makes it all the more necessary for industry to demonstrate good faith, community interest, and public regard by taking the lead in cleaning its own house. An intractible industry that is deaf to public opinion invites bureaucratic regimentation.

Attend to Complaints

When neighbors complain that a company must clean up its stacks, the management should make sure that the complaint receives immediate attention. It is easy to ignore the public's clamor. It is just as easy to declaim eloquently that the matter is being considered—and then forget the entire affair.

The more difficult approach, but the one which will pay dividends, is for management to regard the public not merely as consumers of goods, but also as friends

William E. Rand, an assistant director of Stanford Research Institute, was graduated from Massachusetts Institute of Technology with a B.S. degree in chemical engineering. He also studied in France and Germany. At the Institute he is in charge of technical consultations and advises industrial and governmental organizations on research problems, specializing in atmospheric pollution, fluorine toxicology, pulp and paper, and printing. He had several important positions in industry before coming to Stanford.

Dr. Sawyer

and neighbors. Some one person, or a committee, should study the problem and inform the public of any progress being made to correct the situation.

If the study shows that the factory is committing a nuisance, the cost of installing corrective equipment should be told to the public. All too often, the man in the street thinks that the problem could be corrected easily and cheaply. The costs of providing cleaner air should be made public. The sincerity of the abatement effort will be appreciated when the dollars and cents are publicized.

Mr. Rand

Planning the Location

An ounce of preventive research is worth a pound of curative legislation. The importance of this philosophy is probably appreciated by those firms who have been sued over pollution damage claims. Perhaps a more intensive study of where the plant was originally located would have solved the problem before it arose.

The classic considerations for locating an industrial plant include, among others, proximity to raw materials and markets, cheap and usable water, convenient transportation, adequate labor, and cheap land. To these must be added the factor of air pollution potential. This new factor will grow in importance in direct proportion to the increasing severity of pollution control ordinances.

Stanford Research Institute recently assisted a company in choosing a plant site. Several locations were possible according to the classic considerations. What was not known was how much of a nuisance the plant might be in the future if located in each of these places.

Our scientists examined the wind, its speed, direction, seasonal variations, and diurnal patterns. The stability of the atmosphere was also studied. The topography and its relationship to weather patterns was examined. The general activity of the area was studied.

New Horizons

Answers were found to the following questions: what is the history of air pollution in the area? How far away are farms, schools, towns? What is the possible effect of factory effluents on crops in the area? Is the trend of human activity away or toward farming or industry? Are land prices going up or down? What is the trend of home development?

The possible concentration of pollutants in nearby towns was calculated. Vegetation in the area was analyzed to see how much of the anticipated pollutants had already been accumulated from other sources. After considering all the facts, we were able to reach a conclusion to guide the company management in the selection of the best plant site.

In the case of another plant, the location problem was much easier to solve. A metal processor planned to build in a farming area. In the effluent that would come from the operating plant there was a substance that could harm vegetation if present in sufficient quantities. It was necessary to find out how much of this substance had already accumulated in vegetation surrounding the proposed plant site.

Breaking the Camel's Back

Tests showed that the vegetation had absorbed enough of the substance from a variety of already-existing sources to approach the threshold of injury. Adding more of the substance by the metal processor might exceed the threshold and the firm could be sued for vegetation damage —in spite of the fact that it supplied only a small part of the whole toxic concentration. The recommendation was made against the firm locating there unless economics could justify a very efficient system for recovering the toxic substance.

After a plant location has been selected, plans of the effluent discharge system should be examined to see where they can be improved. Perhaps the stack height should be changed. A general rule is that by doubling the stack height, the ground level concentration of effluent will be quartered. The more variable the wind, the larger will be the area covered by the plume from a stack.

A low stack with a high effluent temperature and exit velocity may have the same diffusion pattern as a high stack with a low effluent temperature and exit velocity. Factories near airports may find restrictions on stack height. Flue gas temperature and velocity may have to be changed in order to increase the effectiveness of the stack as a waste disperser.

Sometimes the buildings near a factory set up turbulent air patterns that cause the effluent to be brought down to ground level a very short distance from the stack. This "down wash" can sometimes be minimized by changing the structural design or by changing the relative positions of buildings and stacks.

After a plant location has been decided upon, some provision should be made for installing a small weather station to record the wind speed and direction, humidity, temperature, and any other data that may help determine what happens to stack effluents after they leave the company property.

Meteorological study will be useful in selecting the best design and location for

pollutant discharge points. A study of wind peculiarities within the company property may tell where piles of powdery materials would best be located.

The Pollution Expert

In several large corporations, the problems related to air pollution have become so complex, and the issues at stake so large, that new positions have been created to cope with the problems as they arise, and preferably before they arise.

The greatest value of the pollution expert to management is his ability to spot potential trouble before it becomes severe, so that necessary steps may be taken to avoid costly difficulties and litigation.

During the past five years Stanford Research Institute has observed several cases where millions of dollars could have been saved if the companies had been aware of their potential pollution problems and the means for solving them. Orderly and efficient field studies should have been made instead of hurried and costly make-shift approaches.

Valid claims should have been settled in a rational atmosphere instead of during periods of public hysteria and impatience. Legal costs and judgments could have been eliminated. Carefully designed and efficient recovery systems could have been installed instead of devices selected to meet an emergency without enough time for development, testing, and proving.

Supply Guidance

Much of this type of guidance could be supplied to management by the company pollution expert. Where the problem requires specialists, he should know where to find them.

At all times, the pollution expert must be able to keep his management informed on current and potential problems, so that proper policy decisions can be made. This means continual and close contact with manufacturing operations and with exploratory field studies.

Where a pollution problem comes to a head, the expert must work closely with the company men making the study. A factory faced with a pollution problem must shift personnel from production, research, and engineering. Obviously, their primary skills and interest lie elsewhere. The knowledge of the expert will help in the proper direction of company personnel and add to the value of assistance drawn in from the outside.

Publish Results

Finally, the expert should advise the engineering departments that are concerned with developing, testing, and installing remedial measures. By knowing what is being done elsewhere in the company, as well as in other organizations, it should be possible for him to suggest new approaches in many cases that might otherwise be slighted for lack of information.

The expert must keep abreast of all technical and scientific developments in the field of pollution. All information must be assimilated and arranged in such a way that it will be of maximum value to management.

The amount of work going on in the field of air pollution is truly tremendous, covering fields such as chemistry, toxicology, medicine, meteorology, and engineering. Many of the pertinent fields are not normally of interest to a manufacturing and sales organization, with the result that the information available will remain untapped unless special efforts are made to obtain and use it.

Where company policy permits, the results of pollution investigation should be published in scientific and management journals. This responsibility would logically fall to the pollution expert.

Guide the Lawyers

The company lawyer charged with defending an air pollution lawsuit, or the settlement of a claim, finds himself in many cases faced with a mass of technical information (and misinformation) that he must use intelligently in order best to represent the company.

It is likely that it will not be for many years, if ever, that the number of air pollution problems will become so great that a separate field of law will be established, such as patent law or admiralty law.

Therefore, the corporation lawyer must find what help he can in interpreting and using the technical data presented to him. He must have someone to consult who can suggest means for getting useful information. Although the research and engineering departments of a company can help, it is apparent that the full-time pollution expert is going to be in a far better position to be of maximum value to counsel.

Where the company's thoughts on air pollution problems must be presented to the public, the expert can be useful in obvious ways: by preparing and interpreting scientific data, and by giving addresses to appropriate civic, scientific, and lay groups.

Follow Recommendations

Although the air pollution expert usually will not have any policy-making responsibilities, he should be so placed in the organization that his recommendations can be made directly to those responsible for policy decisions. Both his position and title should be such that they will command respect in scientific, public, and legal circles.

Since the expert will be dealing with all branches and departments of the organization, as well as with all manner of outside activities, he should report directly to the member of top management who directs all such activities. Following the expert's recommendations for action involves cutting across many lines of authority for getting the job done. He can't do that without at least the ear of top management.

The pollution expert should be on a par with the public relations man and the lawyer. His main purpose is like that of the safety and public relations experts —it is to prevent damage, not to repair it.

The prevention or abatement of air pollution must be more than the responsibility of a single person in an organization. It should be basic to industrial planning.

AIR POLLUTION
A Book Review

A WEALTH of information on various phases of air purification is contained in the recently published volume entitled *Air Pollution*.

This book, published last spring by the McGraw-Hill Book Company, retails for $12.50. *However, a special 15 percent discount is available to members of APCA SPAA. Orders, accompanied by cash or check, should be forwarded to the Secretariat.* The publisher will pay the postage.

Dr. McCabe

The book will make an interesting addition to the shelves of every municipal, industrial, and scientific air pollution control engineer. It is a compilation of the 97 papers that were given at the United States Technical Conference on Air Pollution held in Washington, D.C., from May 3 to 5, 1950.

The impetus for the meeting, which was attended by about 800 persons, was originally given by President Harry S. Truman, who asked Secretary of the Interior Oscar L. Chapman to organize an interdepartmental committee to sponsor the conference.

This committee was formed under the chairmanship of Dr. Louis C. McCabe, Chief, Fuels and Explosives Division, Bureau of Mines, a director of AP&SPAA. Nineteen other government bureaus were represented on the committee.

The resulting conference was divided into seven panels, including agriculture, equipment, health, instrumentation, legislation, and meteorology. The papers presented have been reproduced in the book's 839 pages. Authoritative data relating to many aspects of the problem are presented: pollution effects on human, plant, and animal health; measures and equipment necessary for prevention and control; legal and administrative phases.

The papers have been carefully organized for maximum readability, and the wide scope of the subject matter and authoritative sources make the 3¾ lb. book a practical guide for anyone concerned in any way with the problems of air pollution.

As President Truman stated in his introductory remarks, delivered for him at the opening of the conference by Secretary Chapman:

"With the increasing industrialization of the United States, contamination of the air around us has become a serious problem, affecting all segments of our population. Air contaminants exact a heavy toll. They destroy growing crops, damage valuable property, and blight our cities and the countryside. In exceptional circumstances such as those at Donora, Pennsylvania, in 1948, they even take human life.

"The health hazards arising from air pollution, as shown by the Donora disaster, are especially important. We need to find out all we can about the relationship between air contaminants and illness.

"It is my hope that the exchange of specialized information which takes place at the United States Technical Conference on Air Pollution will contribute toward prompt initiation of collective measures.

"Since the problem of controlling atmospheric contaminants is primarily local in character, I believe that each locality should study its own situation and draft laws adapted to local conditions. Before this can be done, however, standards for evaluation and control of air pollutants need be established. The Federal Government should assume the leadership in doing this part of the overall job and I hope that Congress will see fit to appropriate the necessary funds for research.

"I trust that the recommendations made by this Conference will aid in shaping a comprehensive plan for the study and control of atmospheric pollution. I am most grateful for your participation in this Conference, the progress of which the country is watching with great interest, and I shall look forward to your report."

BLACK BONANZA
A BOOK REVIEW

THE WHOLE DYNAMIC HISTORY of one of the country's key industries comes vividly to life in this true story of the founding of the Union Oil Company, one of the Air Pollution and Smoke Prevention Association of America's sustaining members.

Lyman Stewart, grandfather of William L. Stewart, Jr., Executive Vice President of Union Oil and recently a member of AP&SPAA's Board of Directors, and Wallace Hardison founded the company, and the book, by Frank J. Taylor and Earl M. Welty, follows the growth of the company from the early days in the muddy, brawling Pennsylvania oil rush to the pipelined petroleum business of the present day.

No other phenomenon has changed the lives of Americans more than the *black bonanza* . . . oil. From its first use as a cure-all medicine to the more than 4,000 products in which it is now used, oil has become increasingly important to our everyday existence. It is the virtual lifeblood of the mechanized, rubber-tired world.

Black Bonanza is illustrated with more than 180 photographs—spanning the lifetime of the oil business from the first wells in Titusville, Pa., to the streamlined plants of today. There is a special appendix giving the chronology of Union oil field discoveries.

The $4 book, published by Whittlesey House, subsidiary of the McGraw-Hill Book Company, tells how Union Oil has grown big in a way unique from other big oil companies. By fighting the battles of small independent producers and distributors, it expanded from a little wildcatting operation until its oil hunters probed the earth from Alaska to Paraguay—and even the shelf under the waters of the Gulf of Mexico and the Pacific Ocean.

POINT OF VIEW

(Continued from page 48)

similar in principle to ones developed in the writer's laboratories. (The latter are available from Research Appliance Company, Pittsburgh). Wilson's automatic sulfur dioxide sampler is unique. He employs the standard bubbler through which air is aspirated and SO_2 subsequently determined by conductivity methods. A number of liquid sample bottles are mounted on a turntable and automatic arrangements are provided to drain a sample from the bubbler to a sample bottle, following which the bubbler is automatically refilled for the next sample. Wilson is prepared to make up any of these devices for others on request.

POINT OF VIEW

by W. C. L. HEMEON
Director of Engineering
Industrial Hygiene Foundation
Mellon Institute, Pittsburgh, Pa.

A 51-PAGE REPORT recently issued by the Los Angeles Air Pollution Control District (Second Technical & Administrative Report on Air Pollution Control in Los Angeles County, 1950-51) summarizes its four-year program. A major part of the report deals with the eye irritation nuisance and crop damage problem unique to that area.

Evidence accumulates from this research that hydrocarbons (such as those comprising gasoline vapors, or in fuel burning and waste incineration) that undergo oxidation in the atmosphere by a complex chemistry may be the cause of both phenomena.

In connection with a search for major sources of "smog ingredients," efforts have been made to estimate tonnage rates discharged to the county atmosphere based on measurements in typical installations. Stanford Research Institute in its privately supported research has been similarly engaged and reports its estimates in a recent article ("Air Pollution in Los Angeles County," Magill, P. L., and Benoliel, R. W., Ind. Eng. Chem. 44, 6, p. 1347, June, 1952). It is interesting to compare some of their estimates as we have done in the following tabulation. Units are tons per day.

These figures are in remarkably good agreement, considering the magnitude of the system being appraised.

	Domestic Incinerators		Fuel Oil Burning		Automobile Exhaust	
	L. A.	S. R. I.	L. A.	S. R. I.	L. A.	S. R. I.
Solids	90	5	3	2	—	—
Nitrogen oxides	21	1	85	100	130	40
Sulfur dioxide	1	4	170	220	20	30
Aldehydes	10	8	1	9	10	30
Organic acids	55	2	7	100	7	3

Along with eye irritation and crop damage, reference is always made in discussions of the Los Angeles smog problem to that of "reduced visibility." The literature on smoke problems generally over the years has also emphasized this point. It has always seemed to the writer that the emphasis is misplaced. Let the layman draw conclusions between visibility and the effects that actually bother him: dust fall, soiling of his properties, eye and throat irritation, etc.

It is indeed a privilege to announce that, beginning with this issue, W. C. L. Hemeon, Director of Engineering, Industrial Hygiene Foundation, will write a column for Air Repair. Mr. Hemeon, a specialist on industrial dust control, in-plant and outdoor air pollution, has been on the staff of the Foundation since 1943. He is a native of Boston and a graduate of Massachusetts Institute of Technology and the Harvard School of Public Health. Mr. Hemeon is in charge of current studies on basic aspects of outdoor air pollution being supported by the American Iron and Steel Institute. He is also conducting a survey on air pollution for the City of New Haven, Conn. Mr. Hemeon holds memberships in a number of important technical associations and is considered one of the outstanding authorities on his subject.

Let technical effort be directed toward alleviating the effect. Improvement of visibility is, in our opinion, not the primary objective, at least not in this century. Sometimes it parallels the prime objective, but not always. We feel sure that, in the east, occasional days of reduced visibility would not be objectionable to people if they were not accompanied by objectionable effects on persons and property. We suspect the same situation may prevail in Los Angeles.

* * *

At the recent annual meeting of the American Industrial Hygiene Association held in Cincinnati in April, several papers were read in a session on air pollution.

Profs. H. C. Willett and G. P. Wadsworth of Massachusetts Institute of Technology presented a progress report of their studies at Donora: "Statistical Correlation Between Meteorological Observations and Air Sampling Data."

While results as reported were not clearcut, it is of interest to know that these investigations are to continue on an enlarged scale.

Ralph G. Smith, of Detroit's Department of Health, read "Natural Radioactivity as an Index of Atmospheric Stability." This was an evaluation of the Cowan idea, wherein the natural ventilating capacity of the atmosphere near the ground (which varies with weather conditions) is indicated by measuring radioactivity that emanates from the earth's crust.

W. L. Wilson and F. C. Miles, of the Cleveland Division of Air Pollution Control, presented "The Use of Exposure Panels in Measuring Air Pollution."

The procedures are soundly based on the principle advocated by this columnist, that the pollution effect is the phenomenon of interest. Hence various specimens are exposed to indicate soiling of paint surfaces by soot, blackening of lead paint and silver surfaces by hydrogen sulfide, etching of glass by hydrogen fluoride, and the like.

During the Cleveland meeting many took the opportunity to visit Wilson's laboratory (H. G. Dyktor is in overall charge of the activity in Cleveland) and saw various ingenious items of apparatus devised by Wilson, namely:

An automatic smoke filter, an automatic hydrogen sulfide sampler, both

(Continued on page 47)

LADIES HAD DELIGHTFUL TIME AT CLEVELAND MEETING

By MRS. JOHN L. HODGES
President, Ladies' Auxiliary
Air Pollution & Smoke Prevention Association

As the gavel fell on the morning of June 9, 1952 to mark the opening of the 45th annual convention of the AP&SPAA, the ladies came together for the purpose of socializing, while their hard-working husbands were busy dashing in and out of meetings.

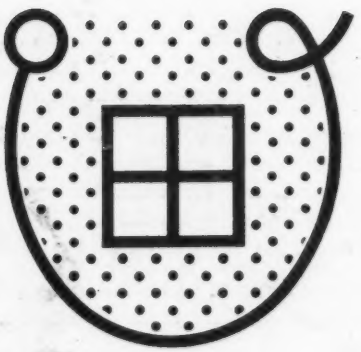
There were 90 ladies registered. The committee of ladies who acted as hostesses were Mrs. G. J. Mateja, Chairman, Mrs. E. J. Kenealy, Mrs. F. S. Mallette, Mrs. F. S. Oertel and Mrs. W. V. Magee. The hostesses were most gracious and most helpful in their eagerness to see that everyone was having a good time.

The first day of the convention opened with the ladies serving a very delightful tea at the Women's City Club. This was preceded by a short travelogue given by C. V. Talbot, Travel Editor of the Cleveland News. On Tuesday morning the ladies convened for a short business meeting for the chief purpose of electing a new president for the ensuing year.

The nominating committee brought to the group the idea that it would be both helpful and gracious to elect the wife of the incoming president for 1953, Mrs. James H. Carter. Since Mrs. Carter was not there attending the convention in Cleveland to speak for herself, there was some doubt expressed that she might not take the office because of illness.

Accordingly, a second person was unanimously elected to take over in the event that Mrs. Carter could not serve. This was Mrs. John L. Hodges, wife of the retiring president. A communication of recent date reveals that Mrs. Carter is unable to take office, hence Mrs. Hodges becomes the president of the ladies group for the coming year.

Tuesday noon a combined luncheon and style show was featured by the Halle Brothers Department Store. A number of very practical and attractive prizes were given out. On Wednesday a three-hour sight-seeing trip was taken by the majority of the ladies, travelling in glass-top buses, taking in most of the most interesting parts of Cleveland and the surrounding suburbs.

The ladies had a very enjoyable time, having many happy memories of Cleveland and the AP&SPAA for 1952. It is hoped that there will be a larger group meeting when the convention will be held in Baltimore, Maryland in 1953.

Printed in U. S. A.